Section 32 Report

Matepā māhorahora/ Natural Hazards

prepared for the

Proposed Waimakariri District Plan

18 September 2021

WAIMAKARIRI DISTRICT COUNCIL

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1. EXECUTIVE SUMMARY

The Waimakariri District is susceptible to a range of natural hazards including:

- Flooding;
- Sea water inundation;
- Tsunami;
- Earthquakes including ground shaking and fault rupture;
- Liquefaction;
- Wildfire; and
- Ice

If development is undertaken without addressing the consequences of these natural hazards, there is potential to increase the risk to property, people's lives and the social and economic well-being of communities.

The Proposed District Plan provisions take a risk-based approach to the management of activities that may be affected by natural hazards. The proposed provisions identify consent categories for activities affected by natural hazards that reflect the consequence that the specific natural hazard presents. The proposed provisions seek to achieve the following outcomes:

- within urban environments – risk is managed by mitigation measures for future development;
- outside of urban environments – In low and medium hazard areas, risk to future development is managed through mitigation measures and is avoided in high hazard areas.

Key changes proposed are:

1. The proposed provisions will apply to a greater range of hazards than the existing District Plan such as liquefaction, fault rupture, the full extent of freshwater flood hazards and sea water inundation;
2. The proposed provisions apply to a greater range of activities including new development, subdivision and infrastructure;
3. The proposed provisions apply across all of the District rather than to different isolated geographic areas;
4. The proposed policies provide clearer direction for assessment of proposed development.

The anticipated outcomes from the proposed provisions are that:

- The risk from natural hazards to property and people will not increase with time as developments with inappropriate levels of risk will not be able to proceed and more developments will include mitigation measures to address the risks associated with a range of natural hazards; and
- Recovery time and damage from natural hazard events will be reduced; and
- Processes for community scale natural hazard mitigation structures that are constructed by statutory authorities will be more efficient; and
- There will be greater control over private natural hazard mitigation structures such as private stopbanks and flood walls which are anticipated to occur more frequently in response to increased flooding frequency as a result of climate change.

2. OVERVIEW AND PURPOSE

2.1 Purpose of Section 32 RMA

The overarching purpose of Section 32 of the Resource Management Act 1991 (RMA) is to ensure that plans are developed using sound evidence and rigorous policy analysis, leading to more robust and enduring provisions.

Section 32 reports are intended to clearly and transparently communicate the reasoning behind plan provisions to the public. The report should provide a record of the evaluation process, including the consultation, technical work, methods, assumptions and risks that informed that process. A robust report can prove highly useful to decision makers, particularly where it clearly communicates the analysis undertaken to identify the most appropriate way to achieve the purpose of the RMA.

The District Council is required to undertake an evaluation of any Proposed District Plan provisions before notifying those provisions. The Section 32 evaluation report provides the reasoning and rationale for the proposed provisions and should be read in conjunction with those provisions.

2.2 Topic Description

Waimakariri District is susceptible to a range of natural hazards. The Operative District Plan has limited consideration of natural hazards and flood hazards provisions have been introduced by scope-limited plan changes (and therefore do not apply to all flood hazard affected areas).

Since the current 'first generation' District Plan became operative in 2005 there have been a number of changes to legislation and higher order policy documents that need to be accounted for by the District Plan review, and are described in section 3.

The proposed provisions recognise national guidance (as outlined in Section 3.2.4) and legislative requirements including a risk-based approach.

The Natural Hazards objectives and policies cover all natural hazards within the Waimakariri District, including those that occur within the coastal environment or have a coastal influence.

While coastal hazards are part of the coastal environment, the provisions for managing these are located in the natural hazards chapter because:

- areas subject to sea water inundation (and tsunami) extend beyond the identified coastal environment, and as such the same provisions would need to be located in two separate chapters;
- coastal erosion is not expected the lifetime of the Proposed District plan because material deposited from the Waimakariri River exceeds the rate of sea level rise. Therefore, there are no hazards identified solely within the coastal environment;
- sea water inundation largely occurs from overtopping of river channels and drains and is therefore dependent on the level of freshwater flow in the rivers and drains at the time of inundation. Sea water inundation is therefore more accurately defined as a combined hazard, rather than being solely a coastal hazard; and
- the area subject to sea water inundation largely coincides with the areas subject to freshwater flooding so including the provisions in one chapter is simpler.

When earthworks, or a subdivision is being undertaken within a Natural Hazard Overlay, the relevant rules are located in other proposed chapters.

Waimakariri District is also susceptible to other natural hazards such as severe winds, raised groundwater tables, drought, and ground shaking from earthquakes. These topics are not specially included in the District Plan review for the following reasons:

- The Council is currently preparing a climate change strategy. The policy responses to changing ground water will be informed by the upcoming Climate Change strategy and may lead to a future district plan change depending on the findings;
- The Building Code under the Building Act 2001 includes the structural measures to address ground shaking and wind loading and the district plan does not need to duplicated legislative requirements;
- Drought is addressed through the emergency management provisions of the Civil Defence Emergency Management Act 2002.

While there is objective and policy support for tsunami, the source events for tsunami are largely remote and emergency management procedures, such as evacuation, ensure the risk to life from these events are reduced and managed. District Plan rules would provide limited additional value in ensuring life safety from distant tsunami events.

2.3 Significance of this Topic

The District is susceptible to a wide range of natural hazards which some of which are influenced by climate change. It is predicted that rainfall events will become more intense, storm events will become more common and sea levels will rise.

Natural hazards are significant because they are widespread, and because of the risk that these events pose to human health, property and infrastructure. The proposed provisions incorporate the latest scientific and technical knowledge and cover the identified natural hazards.

It is therefore important to identify areas susceptible to natural hazards and to restrict or manage subdivision, land use and development (including infrastructure) in these areas proportionate to the risk posed, in order to reduce the potential effects of future natural hazard events.

Within Waimakariri District, the geographic spread of natural hazards varies. This different hazards and their location are summarised as follows:

- **Flooding** geographically affects the region the greatest and affects rural areas from the foothills in the west of the District, to the urban areas in the east and out to the coastline. This hazard affects all main towns including Rangiora and Kaiapoi. The main sources of flooding include the Waimakariri and the Ashley Rivers, as well as overland flow from rainfall on the plains.
- **Liquefaction** is generally present along a line that largely runs parallel to the coastline (for the length of the District), which starts just to the east of Rangiora and extends all the way to the coastline itself.
- **Fault Rupture** - fault lines largely occur in rural areas to the north and west of Rangiora. This natural hazard has one of the smallest geographic extents within the District.

- **Tsunam**i is largely limited to the immediate coastline and some of the inland margins around the Waimakariri and Ashley Rivers.
- **Coastal Erosion** – The coastline in the Waimakariri District is aggrading due to the volume of material being washed down the Waimakariri and Ashley Rivers. As a result, the modelling shows that for the next 130 years, the shoreline in the District is expected to continue to aggrade at a rate that is faster than sea level rise and any resulting coastal erosion. As such, it is considered that these hazards do not present an immediate risk to people or property within the District.
- **Coastal Sea Water Inundation** occurs as a result of storm events, mainly from sea water travelling up the Waimakariri and Ashley Rivers as a result of storm surge and swell events and overtopping the river banks. The extent of inundation is also affected by the level of river flooding occurring at the same time as a storm event. In many areas, the level of coastal inundation is similar to that of the flooding inundation. The extent of sea water inundation will be influenced by sea level rise as a result of climate change.

Legislative amendments to the RMA as a result of the 2010-2011 Canterbury earthquakes place greater emphasis on natural hazard effects when developing plans and assessing resource consents for proposed activities. The proposed provisions seek to give better effect to the purpose and matters of national importance of the RMA by reducing the risk posed to individuals and communities by natural hazards and allowing them to better provide for their social, economic, and cultural well-being and for their health and safety.

2.4 Current Objectives, Policies and Methods

Chapter 8 (Natural Hazards) of the Operative District Plan contains the objectives, policies and methods for natural hazard management, while Chapter 27 (Natural Hazards) and Chapter 32 (Subdivision) contain rules.

Flooding is the main natural hazard addressed by the Operative District Plan. However, this hazard is only identified in selected areas of the District, as a result of previous scope-limited plan changes. As such, not all areas susceptible to flooding are covered by the existing District Plan provisions. Furthermore, there is variation in the provisions within the District Plan for those areas covered. For example, floor levels vary between different locations and have a number of different reference points, such as above ground level, above mean sea level, above kerb level of the road and above a flood event of 0.5% AEP.

Localised flood areas are shown on the District Plan maps, however no other natural hazard features are shown.

The Canterbury Regional Policy Statement ('CRPS') requires the Waimakariri District Council to manage new subdivision, use and development of land in areas on or adjacent to a known active earthquake fault trace, and areas known to be potentially susceptible to liquefaction and lateral spreading. However, aside from one rule that relates to liquefaction risk at Pegasus, active faults and liquefaction are not addressed by the Operative District Plan.

The Operative District Plan objectives, policies and rules do not adequately recognise or identify the scope or extent of natural hazards in the District, and the associated risk to development in these

areas. Consequently, further development undertaken in accordance with the Operative District Plan within areas subject to natural hazards could increase the risk to people and property.

Plan Change 27 to the Operative Plan was prepared for natural hazards management, and is discussed in sections 2.5 and 2.6.

2.5 Information and Analysis

The Proposed District Plan provisions have been informed by a range of technical reports which cover the following hazards:

- Flooding
- Fault rupture and ground shaking
- Sea level rise and sea water inundation
- Liquefaction
- Tsunami

The technical reports identify the level of various natural hazards present to the Waimakariri District. Those hazards that present a greater risk to people, buildings and infrastructure (and which are appropriate to address in a district plan) have been addressed in the proposed provisions. Based on the findings of the reports, the following responses are proposed:

- Objectives, policies and rules for flooding, fault rupture, liquefaction, wildfire, ice and coastal inundation from storm events; and
- Objectives and policies for tsunami.

The technical reports demonstrate that the local coastline is aggrading and this is expected to continue in the long term. This rate of aggradation is modelled to exceed the rate of erosion and sea level rise. Coastal erosion has therefore not been identified as a coastal hazard that requires a planning response within this District Plan review.

A full list of the technical reports used to inform the proposed provisions can be found in Appendix 1.

Table 1 – List of relevant background assessments and reports

Title and Author	Summary
Plan Change 27 Draft s32 Report (not notified) – Waimakariri District Council, 2016. https://www.waimakariri.govt.nz/__data/assets/pdf_file/0019/19315/FINAL-SECTION-32-PLAN-CHANGE-27-NATURAL-HAZARD-MANAGEMENT.pdf **Plan Change 27 Proposed District Plan Amendments** https://www.waimakariri.govt.nz/__data/assets/pdf_file/0020/19316/FINAL-AMENDMENTS-DISTRICT-PLAN-AT-NOTIFICATION-PC27-NATURAL-HAZARDS.pdf	• Section 32 report for Draft Plan Change 27 (PC27) that sought to amend the natural hazards provisions of the District Plan to reflect current legislative requirements and updates in natural hazard knowledge for earthquake fault line and liquefaction risk, as well as localised (rainfall) and river breakout flood risks. • Excludes tsunami, volcanic and geothermal activity, landslip, subsidence (other than associated with earthquake or liquefaction events), wind, drought, fire or other natural hazard events such as snowfall. Also does not address future climate change effects

Title and Author	Summary
Plan Change 27 Proposed District Plan maps https://www.waimakariri.govt.nz/have-a-say/lets-talk/closed-consultations2/natural-hazards-management/draft-proposed-district-plan-maps *Note: this plan change was not progressed separately and was instead incorporated into the District plan review.*	associated with sea level rise in relation to potential inundation. Sea level rise is factored into flood modelling only. • Key changes include: - Rules that restrict activities on the seaward side of the Coastal Hazard Line; - Mitigation of flood hazard risk in low and medium flood hazard areas by setting of minimum floor levels; - Avoiding new development in high hazard areas, except in Residential or Business Zones where the effects of flooding are mitigated; and - Rules to restrict development on land susceptible to liquefaction.
Observations and Options Report – Incite, 2017 https://www.waimakariri.govt.nz/__data/assets/pdf_file/0025/32479/INCITE-FINAL-OBSERVATIONS-AND-OPTIONS-REPORT-REVIEW-VERSION.pdf **Observations and Options Report - Appendix 1:** What We Have Heard https://www.waimakariri.govt.nz/__data/assets/pdf_file/0017/32480/INCITE-FINAL-OBSERVATIONS-AND-OPTIONS-REPORT-APPENDIX-1.pdf **Observations and Options Report - Appendix 2:** List of Actions Requested by Commenters https://www.waimakariri.govt.nz/__data/assets/pdf_file/0018/32481/INCITE-FINAL-OBSERVATIONS-AND-OPTIONS-REPORT-APPENDIX-2.pdf **Observations and Options Report - Appendix 3:** Southbrook Outline Development Plan Area Flooding Maps. https://www.waimakariri.govt.nz/__data/assets/pdf_file/0019/32482/INCITE-FINAL-OBSERVATIONS-AND-OPTIONS-REPORT-APPENDIX-3.pdf	• Summarises the feedback received on PC27 and provides options for discussion on how to progress its development. • Discusses policies for flooding, liquefaction, active faults, coastal hazards, critical infrastructure, and physical mitigation measures. • Suggested changes promote incorporating a risk-based approach.

2.6 Consultation Undertaken

Extensive consultation has been undertaken as part of this District Plan Review process with key stakeholders and the local community. Feedback from public consultation has helped to shape the proposed natural hazards provisions. This includes feedback gathered as part of draft Plan Change 27 in 2016, and also from consultation conducted as part of the full District Plan review process now underway.

2.6.1 Plan Change 27

Feedback received on draft Plan Change 27 was collated in the Observations and Options report prepared by Incite in 2017 along with recommended actions, and is summarised in Table 2.

Table 2 – Summary of issues and recommendations

Issue raised by submitters	**Incite recommendation from 2017 report**
Natural Hazard Objective	Use risk-based approach
Draft flood hazard mapping. - Localised inaccuracies - Outdated report - Need peer review - Lower recurrence interval should be mapped	Recent reviews and updates were undertaken, and modelling will continue to be refined. Must be consistent with Regional Policy Statement. Council staff contact the individual commenters and resolve their concerns on a case-by case basis.
Effect on further development of the Southbrook business area	Allow buildings to be established as permitted activities within existing urban area provided buildings are constructed to the fixed floor level height. Further discussion needed with Regional Council.
Liquefaction Hazard - A more targeted risk-based approach could be adopted (rather than generic liquefaction mapping as proposed).	Consent process will ensure that the adverse effects of the natural hazard are appropriately mitigated on a case-by-case basis. Retain the draft liquefaction policy but change the activity status of subdivisions within the liquefaction hazard area from discretionary to restricted discretionary. In relation to the Ravenswood Development Area, provided a suitably qualified person from GNS Science (or similar) reviews the site-specific report and agrees with its conclusions, it is recommended that the Ravenswood

Issue raised by submitters	Incite recommendation from 2017 report
	Development Area is removed from the liquefaction hazard mapping.
Earthquake Fault Lines - Amendments are made to the style of the mapping and the content of the supporting information on the Council website. - It has been suggested that the actual risks associated with the fault hazard mapping and the implications are not accurately represented.	Draft Policy 8.1.1.6 is amended to ensure that subdivisions in the rural environment, and proposals for new re-zoning consider the effects of fault lines. It is also recommended that a Restricted Discretionary rule is included within the subdivision section supporting the amended policy. 'Fault Awareness Area' for the Ashley Fault is reduced from 30m to 20m, the fault/fold mapping does not use a red colour. Supplementary information is provided outlining the recurrence interval and the rules associated with the fault/fold.
Coastal Hazard Lines - No community comments noted.	Undertaking a full review of the coastal hazards at a district scale may be untimely at this stage, without national guidance related to Policy 24 of the NZCPS. The coastal hazard mapping and provisions are retained as drafted, with the view that the coastal hazard line will need to be reviewed at the District scale in the future.
Critical Infrastructure. - Requirement to avoid critical infrastructure in all natural hazard areas was overly restrictive, and have suggested that this could be limited to the 'High Hazard Areas' only.	Draft Policy 8.1.1.3 - Critical infrastructure and the associated explanation are amended to avoid high hazard areas, unless there is no reasonable alternative. This is consistent with the Regional Policy Statement Policy 11.3.4.

2.6.2 Consultation

Consultation occurred over a number of stages. Stage 1 consultation occurred from 28 June to 26 July 2019, where communities were asked for their insight on local natural hazard issues. This included four drop-in sessions (held in Mandeville on 10 July, Oxford on 11 July, Rangiora on 13 July and Kaiapoi on 13 July). Awareness levels of the consultation was reasonable - more than 13,000 people were reached on Facebook through event listings, reminders and a news story, and 321 unique users visited the Natural Hazards webpages. A total of 20 people (non-Council related) attended the four workshops and 19 respondents completed the survey in hardcopy or online which asked general

questions on such things as which natural hazards were of most concern to respondents. Flooding was the most identified District natural hazard risk, then earthquakes, then sea level rise.

This fed into Stage 2 of the consultation which occurred between 28 August and 25 September 2019. This stage included a range of feedback opportunities and two public meetings (in Kaiapoi on 28 August and Rangiora on 29 August), which provided:

- A summary of the feedback received in Stage 1
- An overview of the key natural hazards in Waimakariri District
- An introduction to a risk-based planning approach
- The proposed approach to managing natural hazard risk in the Waimakariri District.

51 people attended the two sessions (excluding staff and elected reps). Discussion with the community included risks and their management.

Stage 3 of the consultation involved a three-hour focus group (held on 15 September 2020 in Rangiora) on new scientific information about natural hazards (see below) and workshopped how the District plan could respond to manage the identified risks to local homes, businesses and other buildings and activities. This was attended by Councillors, Board Members, developers, community representatives and others who had attended previous natural hazards consultation exercises.

Stage 3 workshop feedback for flooding were:

- New houses in rural areas with medium flooding hazard should be permitted with standards; high hazard flooding is to be subject to resource consent;
- The District Plan should be more permissive for replacement houses in urban high flood hazard areas (permitted with standards);
- Responses did not differentiate between housing and commercial / industrial development – they had the same status, however utility sheds / farm buildings should be permitted;
- Subdivisions were treated consistently with new buildings in rural areas – i.e. permitted with standards in medium flood hazard areas and consent required in high flood hazard areas.

Stage 3 workshop results for active faults were:

- New houses should be prohibited in fault avoidance areas. Consent should be required in awareness areas;
- For replacement houses, commercial and industrial buildings, resource consent should be required in all identified fault areas everywhere;
- Utility buildings should be permitted;
- Subdivisions should be prohibited in fault avoidance areas and resource consent should be required in fault awareness areas.

Stage 3 workshop results for other matters were:

- Liquefaction hazards: generally permit activities / buildings with or without standards; resource consent should be required for subdivisions in liquefaction possible areas;
- Coastal erosion hazards: mixed results ranging from permitting activities / buildings with standards or resource consent required;

- Tsunami: new commercial / industrial activities / buildings should be permitted with standards; residential activities / buildings should require resource consent; hospitals and retirement villages should be non-complying; subdivision should require consent.

New scientific information - hazards portal

To support the District Plan review the Council updated the information it holds on natural hazards and made this available through the following natural hazards portal:

https://maps.waimakariri.govt.nz/portal/apps/MapSeries/index.html?appid=4e0fc6fcfff944d7b243abb389a004ef

A letter was sent to all households in the District in September 2020 informing them of the updated hazards information and the portal, and the portal was made available on the Council's website.

2.7 Iwi Authority Advice

Clause 3(1)(d) of Schedule 1 of the RMA sets out the requirements for local authorities to consult with iwi authorities during the preparation of a proposed plan. Clause 4A requires the District Council to provide a copy of a draft proposed plan to iwi authorities and have particular regard to any advice received. This section summarises the consultation advice received from the iwi authority relevant to the natural hazards chapter, and the District Council's consideration of, and response to (as required by Section 32(4A)(b) of the RMA), that advice.

Table 3: Iwi Authority Advice

Date	Iwi Authority	Subject Matter	Advice Received	Consideration of, and response to, Advice
	Ngāi Tūāhuriri Rūnanga	NH-P3	Need to consider effects on the SPKNZ.	The SPKNZ is included as part of the urban environment to provide greater opportunities to develop. This is more consistent with Kemps Deed than applying the rural zone approach.
		NH-P18	Hard engineering in coastal environment is an issue for Kaitiaki	This activity is recognised as an issue and is managed through the provisions.
		NH-R5	Query what this means for customer connections	Customer connections should be excluded from this rule. A change has been made to clarify this.

		NH-R6	Query how the rule applies within the SPKNZ	The rule applies - it relates to natural hazards which are important to manage everywhere in the District.
		NH-MD3	This does not address cultural considerations	Correct. The MD applies to infrastructure and natural hazards effects on infrastructure, rather than the cultural effects of the provision of infrastructure.
		NH-MD4	Should this refer to coastal flood hazard cultural values?	MD4 identifies matters to consider if buildings do not meet the required standards to avoid or mitigate coastal flood damage. These apply irrespective of cultural concerns. The MD does not consider the cultural effects of the buildings in the first place – this is covered by the Coastal Environment or Sites and Significance to Maori chapters.
		Rules for community scale natural hazard works	Clarification sought on the application of these rules	Clarification provided in follow-up discussions.

2.8 Reference to Other Relevant Evaluations

This Section 32 topic report should be read in conjunction with the following Section 32 chapter/topic evaluations:

- Subdivision - in relation to subdivision provisions in the Natural hazard overlays.
- Earthworks - in relation to the earthworks provisions in the Natural hazard overlays.

3. STATUTORY AND POLICY CONTEXT

3.1 Resource Management Act 1991

3.1.1 Part 2 – Purpose of the Act

Section 5 of the RMA sets out the purpose of the Act, which is to promote the sustainable management of natural and physical resources.

The proposed natural hazards provisions are consistent with Section 5 of the Act as they seek to manage the use and development of resources while sustaining their potential to meet the reasonably foreseeable needs of future generations, by ensuring that future development is not subject to an unacceptable level of risk from natural hazards. The provisions will also enable the community to provide for their social and cultural well-being and health and safety through the application of preventative measures.

In achieving this purpose, authorities need to recognise and provide for matters of national importance identified in Section 6, have particular regard to other matters listed in Section 7, and take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi) under Section 8.

Section 6 of the Act identifies matter of national importance. The Section 6 matters relevant to natural hazards are:

(a) The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use and development;

(h) The management of significant risks from natural hazards.

The proposed objectives, policies and rules are consistent with Section 6 of the Act, as they seek to manage the risks from natural hazards where significant, including in the coastal environment, while recognising the relationship of Māori with their ancestral lands, water, and sites.

Section 7 of the Act identifies other matters to have particular regard to in achieving the purpose of the Act. The Section 7 matters relevant to natural hazards are:

(i) The effects of climate change.

The modelling upon which the provisions are based takes into account climate change (through the incorporation of sea level rise data and changes in rainfall patterns in the flood modelling).

Section 8 requires that the principles of the Treaty of Waitangi (Te Tiriti o Waitangi) be taken into account when undertaking functions and powers under the Act. Iwi were consulted on natural hazards and advice that was provided on the draft provisions is set in section 2.7 of this report.

3.1.2 Part 4 – Functions, powers and duties of central and local government

Section 31 identifies the required functional responsibilities of territorial authorities in order to give effect to the RMA. Section 31(1)(a) requires the establishment and review of objectives, policies, and methods to achieve integrated management of the effects of the use, development, or protection of land and associated natural and physical resources of the District.

In particular, Section 31(1)(b)(i) specifically requires territorial authorities to control any actual or potential effects associated with of the use, development, or protection of land for the purpose of avoidance or mitigation of natural hazards.

The proposed provisions for natural hazards will ensure the Council is meeting its regulatory responsibilities under Section 31. Subject to the directions required by higher order planning documents, the objectives, policies and rules generally require natural hazard sensitive activities in high hazard areas to either avoid or mitigate the risk to people and property and to manage development in lower hazard risk areas.

3.1.3 Part 6 – Resource consents

Section 106 is also a relevant consideration. Section 106 pertains to the consideration of subdivision applications and states:

> *(1) A consent authority may refuse to grant a subdivision consent, or may grant a subdivision consent subject to conditions, if it considers that—*
> *a. there is a significant risk from natural hazards; …*
>
> *(1A) For the purpose of subsection (1)(a), an assessment of the risk from natural hazards requires a combined assessment of—*
> *a. the likelihood of natural hazards occurring (whether individually or in combination); and*
> *b. the material damage to land in respect of which the consent is sought, other land, or structures that would result from natural hazards; and*
> *c. any likely subsequent use of the land in respect of which the consent is sought that would accelerate, worsen, or result in material damage of the kind referred to in paragraph (b).*
>
> *(2) Conditions under subsection (1) must be—*
> *a. For the purposes of avoiding, remedying, or mitigating the effects referred to in subsection (1); and*
> *b. of a type that could be imposed under section 108.*

The proposed natural hazard provisions will assist with the consideration of subdivision applications under Section 106 as they will provide guidance around what is considered to be acceptable risk.

3.2 National Instruments

The following national instruments are relevant to this topic / chapter:

3.2.1 National Planning Standards

The National Planning Standards were introduced in November 2019 with the purpose of improving the consistency of council plans and policy statements.

The National Planning Standards require that natural hazards be covered in a Natural Hazards Chapter with the provisions for coastal hazards required to be contained in the Coastal Environment Chapter. The natural hazard provisions are located in the following chapters, with cross referencing between each chapter:

Table 4: Location of relevant provisions

Subject	Location of Objectives and Policies	Location of Rules
Subdivision provisions for natural hazards, including subdivisions occurring in the Coastal environment and areas affected by coastal inundation	Natural Hazards Chapter Subdivision Chapter	Subdivision Chapter
Earthworks provisions for natural hazards, including those occurring in the Coastal environment and areas affected by coastal inundation	Earthworks Chapter Natural Hazards Chapter (in general)	Natural Hazards Chapter Earthworks Chapter
Infrastructure provisions for natural hazards, including those occurring in the Coastal environment and areas affected by coastal inundation	Natural Hazards Chapter	Natural Hazards Chapter
Provisions for coastal hazard defences in the Coastal environment	Natural Hazards Chapter	Natural Hazards Chapter
Provisions for natural hazards mitigation and natural hazard defences outside of the Coastal environment , but includes areas affected by coastal inundation	Natural Hazards Chapter	Natural Hazards Chapter
Provisions for other development affected by coastal inundation	Natural Hazards Chapter	Natural Hazards Chapter

3.2.2 National Policy Statements

The New Zealand Coastal Policy Statement (NZCPS) is applicable to the natural hazards chapter. The relevant provisions of the NZCPS are as follows:

Table 5: Relevant NZCPS provisions

NZCPS – Relevant provisions	
Objective 5	This objective sets the outcomes that are required when formulating District Plan provisions to address coastal hazards. Council has undertaken research into sea water inundation and coastal erosion. This research has shown that the level of coastal aggradation as a result of material washing down the Waimakariri River is greater than the rate of sea level rise and any resulting coastal erosion. As such, it has been determined that there is no coastal erosion that requires District Plan provisions to control future development. However, the modelling identified that sea water inundation (due to sea level rise) is a hazard that requires district plan provisions to address.
Policy 24 – Identification of coastal hazards	This policy outlines the process and the matters that require consideration when identifying coastal hazards, and prioritising the identification of high hazard areas. Given the of coastal aggradation as a result of material washing down the Waimakariri

NZCPS – Relevant provisions	
	River is greater than the rate of sea level rise and any resulting coastal erosion, it has been determined that there are no areas of high erosion risk, (other than the immediate active beach) which requirements District Plan provisions to control future development. However, the modelling identified that sea water inundation (due to sea level rise) is a hazard that requires district plan provisions to address.
Policy 26 - Natural defences against coastal hazards	This policy seeks to ensure that natural defences that protect coastal land use activities are protected, restored or enhanced, if appropriate, and the proposed provisions respond to this by introducing objectives, policies and rules for natural defences in the Coastal environment .
Policy 27 - Strategies for protecting significant existing development from coastal hazard risk	This policy sets out the matters that needs to be considered when assessing the options to reduce coastal hazard risk, including when it is appropriate to use hard engineering structures, and the proposed provisions respond to this by introducing objectives, policies and rules for hard engineering for coastal hazards.

The National Policy Statement of Urban Development 2020 (NPSUD) is also applicable to the natural hazards chapter. The relevant provisions of the NPSUD are as follows:

Table 6: Relevant NPSUD provisions

NPSUD – Relevant provisions	
Objective 1	This objective requires the consideration of health and safety of future residents when designing and allowing for the development of urban environments.
Objective 8	This objective requires future urban centres to be resilient to the effects of climate change. From a natural hazard context, this includes considering the changes in rainfall as a result of changes in weather patterns and sea level rise.
Policy 1 (f)	This policy sets a minimum requirement that to be considered a well-functioning urban environment, it needs to be resilient to the effects of climate change.
Policy 6 (e)	This policy requires the effects of climate change to be considered by decision makers when making decisions that affect the urban environment.

3.2.3 National Environmental Standards

The following National Environmental Standard and associated provisions are relevant to this topic:

Table 7: Relevant NES provisions

NES	Relevant Regulations
NES Telecommunication Facilities 2016	Section 57 of the NESTF 2016 states that a territorial authority cannot make a natural hazard rule that applies to an identified regulated activity. The regulated activities are identified by regulations 19, 26, 28, 30, 32, 34, 36, 38, 39, 41, or 43 NESTF 2016

NES	Relevant Regulations
NES Freshwater Management 2020	Regulation 51 permits natural hazard mitigation work around wetlands. However, this regulation only applies to Regional Council functions (as identified under Regulation 5) and does not affect territorial authorities.

3.2.4 National Guidance Documents

The following national guidance documents are considered relevant to this topic:

Table 8: National Guidance Documents

Document	Date	Author	Summary
Risk management - Principles and guidelines AS/NZS ISO 31000:2009, and SA/SNZ HB 436:2013 Risk management guidelines — Companion to AS/NZS 31000:2009	2009 2013	Standards Australia Standards New Zealand Standards Australia Limited/ Standards New Zealand	All Hazards -This is the national guidance around the management of risk.
Risk-based land use planning for natural hazard risk reduction	2013	GNS Science	All Hazards – This provides the basis for taking a risk-based approach to the management of natural hazards.
Preparing for future flooding: A guide for local government in New Zealand	2010	Ministry for the Environment	Flooding - This provides guidance on estimating the effects of climate change on flood and options to manage the risk from flooding.
Coastal Hazards and Climate Change: A Guidance Manual for Local Government in New Zealand	2008 Updated 2017	Ministry for the Environment	This document provides non-statutory guidance on addressing sea level rise as a result of climate change. This includes the differing sea level scenarios that should be considered and the need for detailed consultation with the community.
Climate change effects and impact assessment: A Guidance Manual for Local Government in New Zealand - 2nd Edition	2008	Ministry for the Environment	Coastal hazards / Flooding – This is a non-statutory guidance document that provides guidance on the natural hazards that arise or whose effects are worsened by climate change.
Managing Flood Risk – A Process Standard. Standards New Zealand NZS 9401:2008	2008	Standards New Zealand	Flooding - This standard sets out a process for managing flood risk within New Zealand.
New Zealand's next top model: Integrating tsunami inundation modelling into land use planning	2019	GNS Science	This is non-statutory guidance around the management of tsunami hazards. It provides guidance on the level of modelling required for land use planning, management approaches to tsunami and potential mitigation measures.

Document	Date	Author	Summary
Planning for development of land on or close to active faults: A guideline to assist resource management planners in New Zealand	2003	Ministry for the Environment	This document provides guidelines to consider when planning for development close to faults that will have relevance to hazards policy development in District Plans. The guidelines recommend a risk-based approach, based on risk management standard AS/NZS 4360:1999 (latterly AS/NZS ISO 31000:2009). The risk-based approach combines the key elements of • Fault recurrence interval; • Fault complexity; and • Building importance category. The guidance recommends that for land use planning purposes, faults should be mapped and classified at a minimum scale of 1:10,000.
Climate Change Guidance Note	2013	Quality Planning Website	Climate change – This is non-statutory guidance. The aim of this Guidance Note is to: • Promote understanding about the effects of climate change; and • Provide best practice information on how to assess the significance of, and respond where necessary to, the effects of climate change. A particular focus is how this can be done within local authorities' existing risk assessment, policymaking and decision-making processes. The Guidance Note covers: • An overview of how particular regard may be given to the effects of climate change. • Information on expected climate change effects in New Zealand. • Advice on methods for considering and addressing climate change effects under the RMA.

3.3 Regional Policy Statement and Plans

3.3.1 Canterbury Regional Policy Statement

The **Canterbury Regional Policy Statement (CRPS)** was made operative in 2013. The CRPS provides an overview of the resource management issues in the Canterbury region, including natural hazards, and the objectives, policies and methods to achieve integrated management of the region's natural and physical resources. The District Plan must give effect to the CRPS in accordance with Section 75(3)(c)

of the RMA. The objectives and policies relating to natural hazards are contained in Chapter 11 of the CRPS.

A hierarchical approach for managing natural hazards is taken by the CRPS, being in order of priority:

1. Avoidance
2. Mitigation
3. Response and recovery.

The CRPS seeks to avoid new subdivision, use and development (except as provided for in **Policy 11.3.4** Critical Infrastructure) of land in high flood hazard areas. However, in some instances mitigation is considered more appropriate, such as in areas that are already zoned or identified in the District Plan for urban residential, industrial or commercial use.

Of key relevance to the Proposed District Plan provisions is the following CRPS definition of 'High Hazard Areas':

1. *flood hazard areas subject to inundation events where the water depth (metres) x velocity (metres per second) is greater than or equal to 1, or where depths are greater than 1 metre, in a 0.2% AEP flood event;*
2. *land outside of greater Christchurch subject to coastal erosion over the next 100 years;*
3. *land within greater Christchurch likely to be subject to coastal erosion including the cumulative effects of sea level rise over the next 100 years. This includes (but is not limited to) the land located within Hazard Zones 1 and 2 shown on Maps in Appendix 5 of this Regional Policy Statement that have been determined in accordance with Appendix 6; and*
4. *land subject to sea water inundation (excluding tsunami) over the next 100 years. This includes (but is not limited to) the land located within the sea water inundation zone boundary shown on Maps in Appendix 5 of this Regional Policy Statement.*

When determining high hazard areas, projections on the effects of climate change will be taken into account.

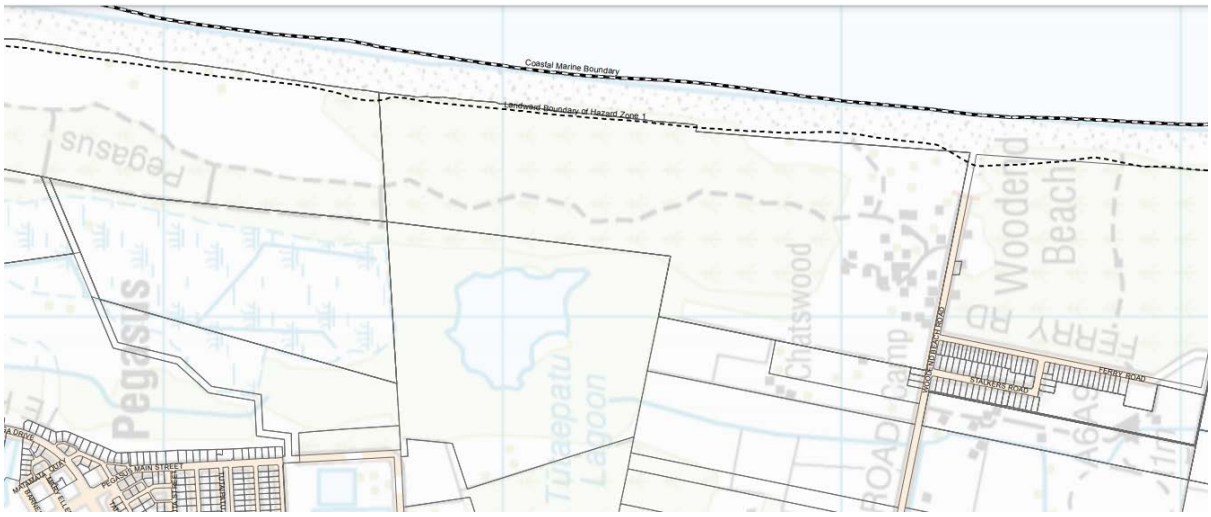
Appendix 2 identifies the objectives and policies contained in the CRPS that are relevant to the management of natural hazards. Sections 7 and 8 of this report outline how the proposed objectives, policies and rules are giving effect to the CRPS.

3.3.2 Regional Coastal Environment Plan

The District Plan must also not be inconsistent with any operative regional plan. Of relevance is the Canterbury Regional Council's Coastal Environment Plan 2005 (RCEP), which gives effect to the NZCPS. The RCEP has objectives, policies and methods, including rules, relating to the coastal environment. These provisions largely relate to hazard mitigation works and to also ensure that buildings within either Hazard Zone 1 or 2 are designed to recognise the natural hazard risk.

In considering coastal hazards, it is helpful to explain the context. The Waimakariri coastline has been in a state of net accretion for some time. Accordingly, the RCEP only maps **Hazard Zone 1** for the District, for land that is at risk from coastal erosion within 50 years, and it is generally delineated by the limit of the active beach and dune system (refer to **Coastal Hazard Zone Map Waimakariri 1** –

Waimakariri 5). An example of the extent of the coastal hazard is shown in the snapshot from Waimakariri 3 in the vicinity of Pegasus and Woodend Beach below.



Accordingly, coastal erosion and inundation is not recognised as an issue for this part of Pegasus Bay (refer to section 3.5 of the RCEP).

Appendix 3 identifies the objectives and policies in the regional Coastal Environment Plan that are relevant to the proposed Waimakariri District Plan natural hazard provisions. Sections 7 and 8 of this report identify and evaluate the proposed provisions for the Waimakariri District Plan. These provisions are consistent with the Regional Coastal Environmental Plan, in that they control hazard mitigation works in a manner than is consistent with the RCEP, for the land that is within the Waimakariri District Council jurisdiction. They also manage natural hazard sensitive activities in areas subject to sea water inundation.

Method 9.6 of the RCEP directs that WDC is responsible for identifying areas likely to be subject to coastal erosion and the effects of sea level rise over the next 100 years through the provisions of their district plan. As part of this this full review, modelling has been undertaken which shows that the rate of coastal accretion will continue, and at a rate that exceeds sea level rise. As such, given the accreting nature of the coastline, there is no coastal erosion which requires a District Plan response as part of this full review.

Method 9.7 notes that the rules contained in the Regional Coastal Environment Plan do not apply in the Waimakariri District where areas likely to be subject to coastal hazards have been identified through the provisions of an Operative District Plan. The Operative Waimakariri District Plan does not identify coastal hazards, but states that it does not include rules that are already included in the RCEP, as they relate to the control of activities and development in a defined Hazard Zone.

3.3.3 Waimakariri River Regional Plan

The District Plan must also not be inconsistent with any operative regional plan. Of relevance is the Canterbury Regional Council's Waimakariri River Plan 2017 (WRP), which promotes the sustainable and integrated management of the Waimakariri catchment's rivers, lakes, hydraulically-connected groundwater and river and lake beds and includes objectives, policies and rules for the management of flood hazard risk. It does this through addressing the flood carrying capacity of the river and the stability of the banks and structures.

The activities managed include (for the Waimakariri River or its tributaries):

- Taking of water;
- Use, diversion, discharge and damming of water;
- Discharge of contaminants;
- Disturbance of river beds;
- Introduction or planting, disturbance, removal or destruction of plants in river beds;
- Use, erection, reconstruction, placement, alteration, extension, removal or demolition of structures in river beds;
- Deposition in river beds; and
- Reclamation or drainage of river beds.

Land use and activities within the beds or rivers in the Waimakariri River Catchment which could reduce the flood-carrying capacity of the rivers or damage the banks of rivers or have adverse effects on the stability or performance of essential structures within riverbeds are identified as an issue **(Issue 7.1). Objective 7.1** sets out the goal to achieving the protection of values in rivers beds that may be progressively degraded or lost, their flood carrying capacity and the stability of riverbanks and structures. **Policy 7.1** sets out how the above issue and objective will be achieved. This is through controlling activities in river beds, specifying that these controls are to manage effect but that in particular the flood hazard to adjacent land is not increased. The WRP seeks that the District Councils in the region align with this direction through their district plans, specifying the provision for the continuation of the construction and maintenance of flood protection works when considering the creation of esplanade reserves and other mechanisms for providing access to and along rivers and lakes.

3.4 Iwi Management Plan

The Mahaanui Iwi Management Plan 2013 (MIMP) is relevant to this matter. The MIMP does not specifically focus on natural hazards. Issue R3 recognises that climate change could have significant effects on the relationship of Ngāi Tahu and their culture and traditions with their ancestral lands, water, sites of significance, wāhi tapu and other taonga, particularly in the coastal area. Policy R3.3 requires that local authorities recognise and provide for the potential effects of climate change on resources and values of importance to Ngāi Tahu, with **Policy TAN6.4(d)** requiring the protection of Ngāi Tahu cultural and historic heritage sites from coastal erosion (as indicated earlier this is not occurring in the District). The 'Sites and Areas of Significance to Māori' chapter and planning maps identify sites within the coastal environment. The coastal environment chapter includes provisions to address coastal erosion, which is consistent with the outcomes sought under the MIMP.

Fracking is also identified as an issue (Issue P18) due to its potential to generate earthquakes.

3.5 Any relevant management plans and strategies

Appendix 4 identifies the relevant non-Resource Management plans and strategies that are relevant to natural hazards. Sections 7 and 8 of this assessment identifies how these other plans have been responded to by the proposed provisions.

3.6 Any other relevant legislation or regulations

The following legislation / regulations are relevant to this matter:

3.6.1 Building Act 2004

The Building Act seeks to ensure the safety and intended performance of any building constructed. Therefore, Council also has responsibilities in relation to the management of natural hazard risk under the Act and the Building Code regulations established under it.

The Building Act defines a natural hazard to mean:

- Erosion - including coastal erosion, bank erosion, and sheet erosion;
- Falling debris - including soil, rock, snow, and ice;
- Subsidence;
- Inundation - including flooding, overland flow, storm surge, tidal effects, and ponding;
- Slippage.

Section 71 of the Building Act requires councils to refuse consent for the construction of a building or major alterations on land that is subject to natural hazards, where the proposed works will accelerate, worsen, or create a hazard on that land or any other property, unless adequate mitigation measures are taken.

Section 72 allows Council to grant building consent for land subject to natural hazards where it is considered that the works will not accelerate, worsen, or create a hazard. In these situations the property owner takes on the risk, which is recorded on the title for the property through procedures under **Section 73** of the Building Act.

Recent changes to the Building Act have extended the requirements for residential construction on liquefaction prone land, and Councils are required to map liquefaction prone areas. New dwellings in these areas must now have a specific foundation design to mitigate the effects of liquefaction and lateral spread.

3.6.2 Civil Defence Emergency Management Act 2002

The Civil Defence Emergency Management (CDEM) Act provides the framework under which natural hazards are to be managed, and sets out the duties, responsibilities and powers of central and local government, lifeline utilities and emergency services. It establishes an 'all-hazards' approach that seeks to achieve the sustainable management of hazard risk through the '4 Rs' of reduction, readiness, response and recovery. The CDEM Act, which is administered by the Ministry of Civil Defence and Emergency Management (MCDEM), requires the formation of a number of regional CDEM Groups and each must prepare a CDEM Group Plan that details how the risks that threaten their region will be managed. It is generally expected that the risk reduction component of the CDEM Group plans will be achieved through land use planning measures under the RMA.

3.6.3 Local Government Act 2002

The Local Government Act (LGA) provides the obligations and powers of local authorities and the general framework under which they must operate. Section 10 states that the purpose of the LGA is to enable democratic local decision-making that meets the current and future needs of communities in terms of infrastructure, services and regulatory performance in a cost-effective manner.

Section 11A(d) directs that in performing its role, local government shall have particular regard to the avoidance and mitigation of natural hazards. It is under the LGA that the Long Term Plan (LTP) is prepared by local authorities, which must cover a period of at least 10 years and provide for integrated and co-ordinated decision-making. It provides a description of local authority activities, which can include actions to manage the effects of natural hazards and climate change. It is also through the LTP

and asset management planning process that Council decides what level of natural hazard protection their assets are to provide (in the case of flood protection and erosion control works) or what level of event they are to withstand (in the case of network infrastructure).

3.6.4 International Agreements

Since 2015, the framework for managing natural hazards in New Zealand has become increasingly influenced by the Government's commitment to three main global agreements, being the **Sendai Framework for Disaster Risk Reduction (2015**), the **Paris Agreement on Climate Change 2016** and the **2030 Agenda for Sustainable Development under which the Sustainable Development Goals (SDGs)** are identified.

The Sendai Framework in particular seeks to shift the focus from managing natural disasters to managing risk and strengthening the resilience of people and communities. This is supported by four priorities for action:

1. Improving the understanding of disaster risk;
2. Strengthening disaster risk governance at all levels;
3. Promoting public and private investment in disaster risk reduction to enhance resilience; and
4. Strengthening of disaster preparedness, and the need to 'build back better'.

The proposed framework for the Waimakariri District Plan is a risk-based approach to the management of natural hazards and is therefore is consistent with New Zealand's obligations under our international agreements.

3.7 Any plans of adjacent or other territorial authorities

The District Council is required to have regard to the extent to which the District Plan needs to be consistent with the plans and proposed plans of adjacent territorial authorities under s74(2)(c) of the RMA.

The adjoining territorial authorities are Hurunui and Selwyn District Councils, and Christchurch City Council. Appendix 5 contains a detailed breakdown of the natural hazard provisions for these Councils. The proposed provisions are consistent with the District Plans of adjoining territorial authorities in the following ways:

- They largely take a risk-based approach to the management of Natural Hazards except for the Operative Selwyn District Plan. The Proposed Selwyn District Plan (notified in 2020), does take a risk-based approach;
- They cover similar hazards (fault rupture, flooding and liquefaction) with some local variation, particularly in relation to coastal erosion, which is not a significant issue for the Waimakariri District Council;
- While there are varying approaches to flood hazards, the overall outcome is largely the same, with buildings being located above the flood level, or avoided in high flood hazard areas. The Christchurch City Council takes a similar approach to the use of certification for flood hazards;

- The recently notified Kaikoura District Plan Change 3 (natural hazards) and Selwyn District Plan require the identification of high flood hazard areas in parts of the District through a flood assessment certificate. This approach is also used in the draft Timaru District Plan.

4. KEY RESOURCE MANAGEMENT ISSUES

The resource management issues set out in this section have been identified using sources of information including (but not limited to) the following:

a. *Primary and secondary research;*

b. *Monitoring and review of the Operative District Plan;*

c. *Issues identified in other documents and plans, including those described above;*

d. *Statutory higher order directions requiring natural hazard risks to be addressed;*

e. *Input from technical expert hazard assessments including flood modelling, geotechnical, fault hazard, coastal inundation and erosion risk assessment.*

The evaluation of objectives and provisions in the following sections relate to the resource management issues stated below:

1. The Operative Plan does not take a risk-based approach as required by Section 6(h) of the RMA;
2. The higher-order direction of the CRPS and NZCPS need to be given effect to, including planning for future growth and managing the exposure of people and property to natural hazard risk including development within Urban environments that is within high flood hazard areas;
3. Operative planning provisions for flooding do not provide a clear and consistent approach to managing this hazard, with different floor levels being applicable to different areas and not all the areas affected by inundation being covered by the District Plan provisions. The flooding provisions also do not recognise overland flow paths and the hazard they present;
4. New natural hazard information for flooding (including sea water inundation), active faults, and liquefaction needs to be incorporated into the District Plan. The District Plan map also need to be updated to map these hazard areas, as they currently only show localised flood areas;
5. Climate change is increasing the scale of natural hazard risk to people and property; and
6. The management of hazard mitigation structures within the coastal environment is required and the need to better recognise the importance of natural defences.

5. OVERVIEW OF PROPOSED OBJECTIVES, POLICIES AND METHODS

The proposed objectives, policies and rules relating to natural hazards in the Waimakariri District take a risk-based approach, which is consistent with the RMA and other relevant higher order documents.

- The approach is based upon the sensitivity of land use activities, life and property risk to natural hazard events. Building activity (i.e. it is used for employment or living purposes - see the definition in section 5.7 below) determines whether a building is sensitive to natural hazards or not. Buildings that do not meet this definition are considered to not be sensitive to

natural hazards and therefore are not covered by the proposed rules, and therefore are permitted by default.

- Each natural hazard (flooding, fault rupture, liquefaction, sea water inundation including the impact of climate change and sea level rise) is then considered on the basis of the hazard level posed (e.g. high hazard, or low / medium hazard).
- The level of risk is determined by combining the sensitivity of an activity with the severity of the hazard in the location.

The proposed provisions generally permit activities where the risk is low, or can be mitigated (e.g. setting of minimum floor levels to reduce flood risk for the mapped flood event), and seeks to control activities where the corresponding risk to life and/or buildings is high. It also distinguishes between activities in hazard areas in existing urban environments, and those in hazard areas outside of existing urban environments.

The CRPS proposes a split approach for urban and non-urban areas. The CRPS recognises that for existing urban areas the community has already accepted a degree of risk, and the ongoing development of these areas should be enabled where risk can be avoided or mitigated. This approach allows for development to still occur within the urban areas and provides flexibility and pragmatism in decision-making to balance the need for ongoing development and growth, while ensuring the risk to people and property is not unduly increased.

The CRPS definition of "Urban Area" is:

> *Within greater Christchurch "Urban Area" comprises the areas zoned in a district plan for Residential, Commercial and Industrial Zones or identified as Greenfield Priority Areas or Future Development Areas identified in the CRPS on Map A of Chapter 6.*
>
> *Outside of greater Christchurch, "Urban Area" comprises the areas zoned or identified in a district plan for urban residential, industrial or commercial use, at the date of notification of the CRPS (18 June 2011).*

For ease of application and to better align with the NPS-UD, the Waimakariri District Plan urban environment includes all the zones located within existing towns and large lot residential zones. All of MR 873 is also included as being with the urban environment as this inclusion better provides for the activities provided for under Kemps Deed. These areas are distinguished on the planning map via an Urban Flood Assessment Overlay and a Non-Urban Flood Assessment Overlay.

New natural hazard sensitive activities should be avoided in the high flood hazard areas of the Natural hazard overlays outside of existing urban environments and the risk needs to be mitigated for hazard areas that are not considered to be high. Buildings which do not meet the definition of natural hazard sensitive activities are considered to present a sufficiently low risk from the impacts of natural hazards and therefore are permitted within the natural hazard overlays.

Regionally significant infrastructure has its own set of rules in the Natural Hazards Chapter.

Earthworks do not affect all natural hazards. Some hazards like for example fault rupture are not affected by earthworks. The earthworks provisions for natural hazards are primarily contained in the Earthworks Chapter (earthworks provisions for infrastructure are contained in the natural hazards chapter).

5.1 Strategic Direction

The following Strategic Direction Objective is proposed for natural hazards:

SD-O6 - Natural hazards and resilience

The District responds to natural hazard risk, including increased risk as a result of climate change, through:

1. avoiding subdivision, use and development where the risk is unacceptable; and
2. mitigating other natural hazard risks.

This strategic direction gives effect to Section 6(h) of the Act and the NZCPS. The proposed objective also gives effect to the objectives and policies under the CRPS. The proposed objectives, policies and rules of the Natural Hazards Chapter identify when risk is unacceptable and when mitigation measures are appropriate to address natural hazard risk and therefore are consistent with this strategic direction.

5.2 District-wide Subject

The proposed objectives, policies and rules are District wide, with specific areas identified through various natural hazard overlays shown on the District Plan map.

5.3 Proposed Objectives and Policies

The proposed Natural Hazard objectives and policies are contained in Appendix 6 to this report.

The proposed objectives and policies address the resource management issues identified in Section 3 by requiring that a risk-based approach to managing natural hazard risk and giving effect to the direction of the RMA and the CRPS. The policies also give effect to Policy 11.3.1 of the CRPS by being more permissive of development and use in high hazard areas of existing urban environments, provided the risk can be mitigated.

The proposed policies recognise that there are different approaches needed for different natural hazards. The proposed policies provide direction around how, when and what mitigation measures for certain natural hazards need to be considered.

The proposed policies recognise that some activities are beneficial for reducing the consequences of natural hazards to local communities, such as community scale hazard mitigation works, and retaining natural defences which provide protection from natural hazards. The policy framework actively seeks to enable these works.

The proposed policies recognise that there are different hazard areas within the proposed flood assessment overlays and that each of these hazard areas require differing responses whether they are urban or outside urban environments and whether they are a low / medium or high hazard.

The proposed policies also provide direction on how critical and non-critical infrastructure in the natural hazard overlays needs to be addressed, being more permissive for non-critical infrastructure and more restrictive for critical infrastructure.

The policies also provide guidance around the various hazard mitigation works and give effect to the NZCPS and the CRPS by avoiding the use of hard engineering solutions in the coastal environment,

instead promoting the retention and maintenance of natural systems, such as dunes, to mitigate coastal hazards.

5.4 Proposed Methods

5.4.1 Natural Hazards Chapter

The proposed rules for natural hazards summarised as follows:

In general, where the risk to life and property is relatively low then the proposed rules are permissive. This applies to:

- Non-natural hazard sensitive activities in all hazard areas; and
- Natural hazard sensitive activities in the Urban and Non-Urban Flood Assessment Overlays when certain permitted activity conditions are met.

The activity status becomes more restrictive for natural hazard sensitive activities as the risk to development increases. Additionally, the policy and rule framework distinguish the approach depending on whether the location is within an urban or a non-urban area. This is to give effect to Policy 11.3.1 of the CRPS, which directs that activities should be avoided within the high hazard areas except where located within the identified urban environments, in which case they must either avoid or appropriately mitigate the hazard effect. This approach recognises that communities in the District's existing towns have historically accepted a higher level of risk than would be tolerated for new communities seeking to establish.

Standardised minimum floor levels are introduced district wide for consistency and provided for as a standard for both permitted and restricted discretionary activities. The use of Flood Assessment Certificates to confirm activity status is a common approach within the region (see section 3.7). The proposed approach remains consistent with the regional direction. The permitted activity status assists with reducing the potential number of resource consent applications, particularly outside of high flood hazard areas. This is due to the most common approach to dealing with this hazard being a minimum floor level, to ensure that future buildings are not inundated with flood waters. The proposed approach ensures that buildings that achieve the minimum floor levels within the low hazard area remain permitted activities.

In non-urban environment the rule framework manages new natural hazard sensitive activities in high flood hazard areas of the Flood Assessment Overlay as non-complying activities. Policy NH-P3 and the relevant matters of discretion (NH-MD1 – NH-MD3) provide decision-makers with guidance for when it might be acceptable to locate these activities within high flood hazard areas. This is consistent with CRPS Policy 11.3.1 which states that new subdivision, use and development within high hazard areas will be avoided unless the activity is unlikely to result in a loss of life or result in significant damage to property for sites located outside the recognised urban environments identified in CRPS Policy 11.3.1.6. In this way the creation of unnecessary and unacceptable high natural hazard risk is avoided, while still allowing consideration of future development subject to the risk being mitigated.

For activities in the non-urban environment within overland flow paths, the rule framework requires resource consent as a Restricted Discretionary Activity to allow for the consideration of the potential impacts from development within overland flow paths. Potential effects of development in overland flow paths include damage to the proposed buildings and increased risk to life, as well as the diversion

of overland flow onto neighbouring properties, and potentially increasing the risk to neighbouring residents and buildings.

For hazard sensitive activities in the non-urban environment which are located within the Non-Urban Flood Assessment Overlay, but are not located within either a high flood hazard area or an overland flow path as determined by the Flood Assessment Certificate, the rule framework provides for activities as permitted subject to minimum floor level certification above the 0.5% AEP flood event. This mitigates the flood risk and where the standard is not met the activity is elevated to restricted discretionary in order to enable assessment via a resource consent. This is consistent with the direction of CRPS Policy 11.3.2 which states that new subdivision, use and development should be avoided unless there is no increased risk to life and new buildings have an appropriate floor level above the 0.5% AEP design flood level.

The District Plan does not identify high flood hazard areas on the planning maps. Rather, these are determined through the flood assessment certificate approach. The high flood hazard areas are not mapped in the District Plan because the LIDAR is flown regularly and the modelling updated. The certificate approach enables the latest information to be used for flood assessment purposes. The Council has however provided indicative high flood hazard areas on natural hazards maps that sit outside of the District Plan as a guide for prospective developers (https://waimakariri.maps.arcgis.com/apps/MapSeries/index.html?appid=16d97d92a45f4b3081ffa3930b534553).

The Ashley Fault Avoidance Overlay is entirely located within the non-urban area of the District. Given the potential risk that the Ashley Fault presents to people and property, and given the direction of the CPRS, the activity status for any new Natural hazard sensitive activities within this Overlay is Discretionary and is supported by NH-P5. This policy gives clear direction to resource consent planners around the need to consider the potential risk to building damage and people's lives from any development being undertaken within this Overlay.

Within the Ashley Fault Avoidance Overlay additions of up to 25m^2 are permitted. This size allows for small additions to the existing buildings to be undertaken to allow for their continued use and functionality. However, the size limits mean there is not a significant increase in risk from these additions being undertaken, when compared to the existing situation.

The infrastructure rules for the natural hazard overlays are located within the natural hazards chapter. As with the rules for Natural hazard sensitive activities, the proposed provisions take a risk-based approach in that the upgrading of existing infrastructure, non-critical infrastructure and critical infrastructure that is below ground or if within either the Urban Flood Assessment Overlay or the Non-Urban Flood Assessment Overlay, but are not located within either a high flood hazard area or an overland flow path as determined by the Flood Assessment Certificate, is permitted, subject to the standards being met.

Critical infrastructure which is above ground, and either located within an overland flow path or high flood hazard area as determined by the Flood Assessment Certificate, or is within the Fault Awareness Overlay requires resource consent, with exceptions provided for small scale infrastructure or infrastructure which is not subject to flood risk. This is to ensure that this infrastructure is able to remain operational following a natural hazard event and that they do not result in increased risk to neighbouring properties as a result of their establishment.

In the Ashley Fault Avoidance Overlay, critical infrastructure is discouraged through a discretionary activity status due to the potential consequences that could arise from fault rupture along this fault line.

Wild fire and vehicle crashes from icy roads are managed through setback and height restrictions on shelterbelts and woodlots in rural zones. The provisions are limited to rural zones as this is where woodlots and shelterbelts are more likely to occur, water supply for firefighting can be limited and where 100km speed limits apply. The ice road provisions are further limited to four main east west roads (South Eyre Road, Tram Road, Oxford Road, and Birch Hill Road). Although limited, crash data indicates that the District does have crashes on rural roads due to ice.

The planting of vegetation as part of natural hazards mitigation works is a permitted activity. The provisions further distinguish between maintenance and new hazard mitigation works (recognising the need to undertake maintenance), and between those undertaken by private individuals versus community scale works undertaken by the Crown, local authorities or their agents (recognising the importance of community scale works). In addition, community scale works within identified ONLs, ONFs and the SAL require consent as a restricted discretionary, while hard engineering is fully discretionary within the Coastal Flood Assessment Overlay. These requirements help give effect to objective NH-O4, which supports the use of natural defences and systems to mitigate the risk from coastal hazards. This approach gives effect to Policy 25 of the New Zealand Coastal Policy Statement, which discourages the use of hard protection structures in areas potentially affected by coastal hazards and promotes the use of alternative, natural defence measures to mitigate the risk from coastal hazards.

It is also recognised that Policy 11.3.6 of the CRPS requires natural topographic (or geographic) and vegetation features that have a role in mitigating and avoid natural hazards should be maintained, protected and restored. The proposed rules ensure that this policy is given effect to. Overall, the policy and rule framework takes a risk-based approach in accordance with the CRPS policy direction to manage hazard risk to people and property by managing development with a range of activities statuses.

It is recognised that during storm events, inundation can occur through the sea inundating land through the river system. This occurs as a result of a combination of sea level rise, storm surge and wave interface and the river levels at the time as a result of rainfall associated with the storm event. This area has been mapped as a Coastal Flood Assessment Overlay. The proposed approach to development within the Coastal Flood Assessment Overlay is similar to that of the Flood Assessment Overlay. The rule framework provides for natural hazard sensitive activities in high coastal flood hazard areas within existing urban environments as a permitted activity. This is subject to the risk being mitigated through the application of minimum floor levels as determined by a Coastal Flood Hazard Assessment Certificate (this is a similar approach to the Flood Assessment Certificate previously described).

In non-urban areas the framework manages new Natural hazard sensitive activities in the Coastal Flood Assessment Overlay. The rule framework allows for Natural hazard sensitive activities, as a permitted activity where either:

- The minimum floor level on a consent notice or approved subdivision plan is met (providing these are less than five years old); or

- Where the minimum floor level is met, as outlined in the Coastal Flood Hazard Assessment Certificate is met, and the total inundation depths do not exceed 0.29m. This figure has been identified as the threshold for low coastal flood risk and is one that is usually easily resolved by the provision of minimum building floor levels.

If the coastal inundation depths are between 0.3m and 0.99, and where the minimum floor level is met (including by raising the land), as outlined in the Coastal Flood Hazard Assessment Certificate then the activity is a Restricted Discretionary Activity. Restricted discretionary status is considered appropriate for sea water inundation flooding of this depth in non-urban areas in order to assess matters such as access and egress and flood water displacement resulting from raised land levels. Where the depth is 1m or more, the flooding is identified as high coastal flood hazard and the use of the land for hazard sensitive activities is Non-Complying.

Importantly, this approach can take into account land raising through filling. If land is raised and subsequent re-modelling shows a depth of flooding to be less than 1m the site will no longer be identified as high coastal flood hazard. Flood water displacement would need to be considered as part of proposals to raise land and is considered via the earthworks provisions.

The certificate approach allows for consideration of the most up-to-date modelling and the timeframe within which the sea level rise is expected to occur. The timeframe is important as proposed activities need to be able to occur in the absence of frequent flooding events that would require additional hazard mitigation measures or retreat within the expected lifetime of the activity. Timeframes are also relevant for determining the certainty of the magnitude of sea level rise - there is much greater certainty of sea level rise magnitude occurring over shorter timeframes than longer timeframes.

Critical infrastructure which is above ground, and is within the Coastal Flood Assessment Overlay follows the same approach as new Natural hazard sensitive activities in the Coastal Flood Assessment Overlay as identified above, with exceptions provided for small scale infrastructure or infrastructure which is not subject to flood risk. This is to ensure that this infrastructure is able to remain operational following a natural hazard event and that they do not result in increased risk to neighbouring properties as a result of their establishment.

5.4.2 Subdivision Chapter

Proposed Objectives and Policies:

The objectives and policies relating to subdivision in the identified natural hazard overlays and the coastal hazard overlay are also contained in the Natural Hazards Chapter. The relevant rules for subdivision in the identified natural hazard overlays and the Coastal Flood Overlay however are located in the subdivision chapter.

Proposed Methods:

The rules for subdivision in natural hazard areas give effect to Policy 11.3.1 of the CRPS, which directs that subdivision should be avoided within the high hazard areas except where located within the identified urban environments, in which case they must either avoid or appropriately mitigate the hazard effect. For this reason, subdivision in the high flood hazard area of the Urban Flood Assessment Overlay in Urban environments is a restricted discretionary activity. This activity status allows for growth and development where the risk to life and property can be mitigated within Urban environments. In contrast, within the Non-urban Flood Assessment Overlay and the Coastal Flood

Assessment Overlay, the subdivision of land within a high flood hazard area is a non-complying activity. Policy NH-P3 provides decision makers with guidance on when this subdivision might be appropriate in the high flood hazard area.

Subdivision within the Ashley Fault Avoidance Overlay is a non-complying activity. This recognises that the potential risk to property and life from fault rupture along this fault line is high, particularly if the building platform is located within 20m of the fault line. However, it may be possible to undertake subdivision creating new lots within the Ashley Fault Avoidance Overlay where future building platforms could be located more than 20m from the fault line (and therefore outside of the area that presents an immediate risk to people and property). In this way the creation of unnecessary and unacceptable natural hazard risk is avoided, while still allowing future development where risk can be mitigated, which is implementing the direction in Policy 11.3.1 of the CRPS.

A similar approach to subdivision is taken within the Fault Awareness Overlay, with the exception that the activity status for the subdivision is discretionary as opposed to non-complying. This recognises the longer rupture periods of the fault lines within the Fault Avoidance Overlay and therefore the lower risk to future buildings and people compared with the Ashley Fault. However, the Discretionary Activity status does allow for inappropriate subdivision to be declined, where the risk to people and property is considered to be unacceptably high. Instances of this may include where the building platforms are located on the fault lines themselves.

Subdivision where building platforms are created within the Liquefaction Hazard Overlay is managed as a controlled activity. This is to allow for Council to consider the potential effects from liquefaction on future lots and allows for conditions to be imposed to ensure that the risk to future property damage is appropriately mitigated.

The proposed subdivision rules balance the demand for development with the relative level of risk posed.

5.4.3 Earthworks Chapter

The Earthworks Section 32 report assesses the proposed policies and rules for earthworks within the Flood Hazard Assessment Overlay.

5.4.5 Definitions

The natural hazards chapter introduces a specific definition for Natural hazard sensitive activities. This definition is as follows:

Buildings which:

- contain one or more habitable rooms; and/or
- contain one or more employees (of at least one full time equivalent); and or
- is a place of assembly.

Except that this shall not apply to:

i. regionally significant infrastructure;
ii. any attached garage or detached garage to a residential unit or minor residential unit that is not a habitable room;
iii. any building with a footprint of less than 25m^2; or

iv. any building addition in any continuous 10-year period that has a footprint of less than 25m^2.

Buildings which are not natural hazard sensitive are considered to present a sufficiently low risk from the effects of natural hazards. As such, they are permitted by the virtue that there is no rule which requires resource consent for their undertaking within the natural hazard overlays.

The chapter also introduces definitions for high flood hazard area and high coastal flood hazard area. These are based on the CRPS definition for high hazard, which has been split into two separate definitions to cover fresh water flooding and sea water inundation separately. The coastal definition includes reference to sea level rise and 100 year storm surges as the NZCPS requires the identification of areas that are potentially affected by coastal hazards over at least the next 100 years and includes a requirement to consider the cumulative effects of sea level rise, storm surge and wave height under storm conditions.

While the high flood hazard definition includes assessment of water velocity, this is not included in the high coastal flood hazard definition, which relies on flood depth only. This is due to the nature of the sea water inundation which is likely to be slow moving across the flood plain after over topping river banks in the coastal environment. For lower velocities (e.g. less than 0.5 m/s), hazard thresholds are often independent of velocity and defined by water depth only. The definitions are as follows:

High Flood Hazard Area means:

a. land where there is inundation by floodwater, and where the water depth (metres) x velocity (metres per second) is greater than or equal to 1, or where depths are greater than 1 metre, in a 0.2% Annual Exceedance Probability flood event.

High Coastal Flood Hazard Area means:

a. land likely to be subject to coastal erosion, including the cumulative effects of sea level rise, over the next 100 years; and
b. land subject to water depth of 1 metre or greater in a 1% AEP (1 in 100-year) storm surge event (excluding tsunami), concurrent with 5% AEP (1 in 20-year) river flow event with a median sea level rise projection over the next 100 years based on a continuing high emissions scenario (e.g. RCP8.5) in the latest national guidance.

6. SCALE AND SIGNIFICANCE EVALUATION

Section 32 (1)(c) of the RMA requires that a Section 32 report contain a level of detail that corresponds with the scale and significance of the environmental, economic, social and cultural effects that are anticipated from the implementation of the proposed objectives, policies and methods.

The level of detail undertaken for the subsequent evaluation of the proposed objectives, policies and methods has been determined by this scale and significance assessment.

In particular, Section 32 (1)(c) of the RMA requires that:

(a) Any new proposals need to be examined for their appropriateness in achieving the purpose of the RMA;

(b) The benefits and costs, and risks of new policies and methods on the community, the economy and the environment need to be clearly identified and assessed; and

(c) All advice received from iwi authorities, and the response to the advice, needs to be summarised.

Further, the analysis has to be documented to assist stakeholders and decision-makers understand the rationale for the proposed objectives, policies and methods under consideration.

In making this assessment regard has been had to a range of scale and significance factors, including whether the provisions:

(a) Are of regional or district wide significance;
(b) Involve a matter of national importance in terms of Section 6 of the RMA;
(c) Raise any principles of the Treaty of Waitangi (Te Tiriti o Waitangi) under Section 8 of the RMA;
(d) Address an existing or new resource management issue;
(e) Adversely affect people's health and safety;
(f) Adversely affect those with particular interests including Maori;
(g) Adversely affect a large number of people;
(h) Result in a significance change to development opportunities or land use options;
(i) Whether the effects have been considered implicitly or explicitly by higher order documents; and
(j) Include regulations or other interventions that will impose significant costs on individuals or communities.

Policies and methods have been evaluated as a package, as together they address a particular issue and seek to meet a specific objective.

6.1 Evaluation of Scale and Significance

	Low	Medium	High
Degree of change from the Operative Plan			✓
The degree of change from the Operative Plan is high, as the current 'first generation' plan is effects-based, whereas the proposed policy framework for natural hazards will introduce a risk-based approach. The proposed provisions also cover a greater range of natural hazards than the existing provisions and in a more comprehensive and coherent manner. This includes fault rupture, a greater geographic consideration of flooding and liquefaction and sea water inundation.			
Effects on matters of national importance			✓
The Proposed Plan manages significant risk from natural hazards as a matter of national importance (Section 6(h) RMA). The policy direction is also consistent with higher order requirements, and takes the approach of managing natural hazards relative to the risk presented by the natural hazard. For example, in comparison to the Operative Plan, the Proposed Plan is more restrictive as it seeks to avoid Natural hazard sensitive activities in high hazard areas, such as close to active faults or the high flood hazard area of the Non-Urban Flood Assessment Overlay.			

It does however provide for hazard-affected activities within identified high flood hazard areas within the Urban Flood Assessment Overlay, provided minimum floor levels are adhered to, to reduce risk. This approach also gives effect to the policy direction of the CRPS. The proposed provisions for minimum floor levels for buildings in the Coastal Flood Assessment Overlay, natural defences in the coastal environment, and hazard mitigation works are consistent with the policy direction of the NZCPS and the CRPS.			
Scale of effects geographically (local, district wide, regional, national)			✓
The proposed provisions apply to the mapped extents of the Urban Flood Assessment Overlay, the Non-Urban Flood Assessment Overlay, the Coastal Flood Assessment Overlay, the Liquefaction Overlay, the Ashley Fault Avoidance Overlay and the Fault Awareness Overlay. They also apply to residential development within rural zones generally. As such, the provisions apply to most of the District.			
Scale of effects on people (how many will be affected – single landowners, multiple landowners, neighbourhoods, the public generally, future generations?)			✓
The proposed provisions affect the majority of the properties in the District. This is because the extensive nature of the hazard overlays and where the highest concentration of development occurs in the District.			
Scale of effects on those with specific interests, e.g., Mana Whenua, industry groups		✓	
The scale of the effects on tangata whenua and special interest groups and the wider community is assessed as medium, as there is a relatively large change to the current management of development and land use in relation to natural hazards is proposed across a large part of the District, but the main effect is on land owners, agencies and infrastructure providers.			
Degree of policy risk – does it involve effects that have been considered implicitly or explicitly by higher order documents? Does it involve effects addressed by other standards/commonly accepted best practice? Is it consistent, inconsistent or contrary to those?		✓	
The requirement to address natural hazard risk is a Matter of National Importance under the RMA and is also a higher order direction under the CRPS. The proposed approach is consistent with that of other councils in the Canterbury region. The proposed approach is also consistent with the non-statutory guidance for natural hazard risk management. While the proposed coastal hazard provisions are relatively novel and there is little detailed higher order planning guidance, the NZCPS requires these to be addressed.			
Likelihood of increased costs or restrictions on individuals, communities or businesses		✓	

Buildings and land affected by the proposed hazard areas may cause landowners to raise concerns about the restrictions on their private property rights, resale value and implications for insurance. However, much of the natural hazard information incorporated in the Proposed Plan is already publicly available from the Waimakariri District Council's hazards portal, the Canterbury Regional Council (e.g. coastal hazard zones), or is placed on Land Information Memorandum (LIM) reports requested from WDC (e.g. fault avoidance zones). Current and future generations will benefit from the improved management of natural hazard risk.
Summary - Scale and Significance Overall, it is considered that the scale and significance of the proposal is **medium-high.**

7. EVALUATION OF PROPOSED OBJECTIVES

Section 32(1)(a) of the RMA requires the District Council to evaluate the extent to which the objectives are the most appropriate way to achieve the purpose of the RMA. The level of detail undertaken for the evaluation of the proposed objectives has been determined by the preceding scale and significance assessment. Below is a summary of the proposed objectives that have been identified as the most appropriate to address the resource management issue(s) and achieve the purpose of the RMA, against those objectives in the operative plan.

Given the higher order direction for natural hazards, no assessment of alternative objectives (for example non-statutory approach to the management of natural hazard risk) has been undertaken. The directive nature of Section 6(h), NZCPS, and CRPS, means that a risk-based approach to the management of natural hazards is required, with the risk outcomes for the urban and non-urban environments (and associated interventions such as mitigation measures) specified. Given this higher order direction, the evaluations of the objectives has been limited to the existing District Plan approach and the proposed objectives.

7.1 Evaluation of Proposed Objectives

Natural Hazards

Existing Objectives (status quo)	Appropriateness to achieve the purpose of the RMA
Objective 8.1.1 The community's understanding of natural hazards and its behaviour prior to, during, and after natural events avoids or mitigates natural hazards to an accepted level. Objective 8.2.1 The community's desired level of protection from flood events is achieved through an appropriate	**Relevance:** Objective 8.1.1. is broad and is largely focused on the behaviour of the community to address the consequences of natural hazards. This objective is not risk-based and does not provide clarity to what aspects of natural hazards need to be avoided or mitigated. As such, as it is currently worded, this objective does not give effect to Section 6(h), NZCPS or CRPS as it is not addressing risk from development. Objective 8.2.1 addresses the consequence side of the risk equation, and therefore can be considered to be a risk-based objective, even though it does not specifically reference risk. This objective is flood focussed, which is the main hazard that

Existing Objectives (status quo)	Appropriateness to achieve the purpose of the RMA
combination of measures to modify the level of flooding, modify susceptibility to damage and deal with the consequences of floods. Objective 8.3.1 Increase Council and community understanding of the earthquake risk and associated natural hazard.	impacts Waimakariri and therefore has a high degree of relevance to the District. Objective 8.3.1 is an educational based objective and does not address the risk associated with natural hazards. This objective as currently worded does not give effect Section 6(h), NZCPS or the CRPS in relation to fault and liquefaction hazards. In addition, the objective in one that cannot be achieved by the implementation of the policies and rules. The existing objectives assist Council with undertaking their functions under s.31 of the Act.
	Reasonableness: Objective 8.1.1. and 8.2.1 impose additional costs on the community as there are lost opportunity costs (as some sites will not be able to be developed further) and other developments need to incorporate mitigation measures to ensure that the impacts from natural hazards are reduced to an acceptable level. However, these costs need to be balanced in the consideration of changing insurance and banking markets (where developments in high risk areas may not be able to obtain insurance or finance in the future) and the costs associated with disrupted communities as a result of damage from natural hazard events. Overall, it is considered that the existing objectives do not give rise to unjustifiability high costs on the community, although some properties will be more impacted than others. Objective 8.3.1 does not impose any costs on development as it is an educational objective. However, this objective has the potential to impose costs on the community through damage from fault related activities. While Objective 8.1.1 is broad enough to capture fault related hazards, there is the potential for planners to place greater weight on Objective 8.3.1 when assessing resource consents within areas susceptible to fault hazard, given its specific reference to fault hazards. The threshold to achieve this objective is low, and as such this could be seen to enable development to proceed in areas susceptible to fault hazards.
	Achievability: The outcomes of the proposed objectives are achievable through Council's RMA functions, Local Government

Existing Objectives (status quo)	Appropriateness to achieve the purpose of the RMA
	documentation such as Asset Management Plans, public education and emergency management.

Proposed Objective	Appropriateness to achieve the purpose of the RMA
NH-O1 Risk from natural hazards New subdivision, land use and development: 1. manages natural hazard risk, including coastal hazards, in the existing urban environment to ensure that any increased risk to people and property is low; 2. is avoided in the Ashley Fault Avoidance Overlay and high hazard areas for flooding outside of the urban environment where the risk to life and property are unacceptable; and 3. outside of the urban environment, is undertaken to ensure natural hazard risk, including coastal hazard risk, to people and property is avoided or mitigated and the ability of communities to recover from natural hazard events is not reduced.	**Relevance:** The proposed objective gives effect to Part 2 of the RMA as follows: - s5 - it provides for the sustainable management of the District by ensuring developments are designed to avoid or mitigate the effects of the natural hazard, which also provides for the social, economic and cultural well-being of the local community as well as their health and safety. - Section 6(h) - the framework manages future development in the natural hazard and coastal hazard overlays. - Section 7(i) – the flood modelling and coastal inundation modelling has taken into account climate change. The proposed objective also assists Council with undertaking their functions under s.31 of the Act. The proposed objective applies to a variety of natural hazards, thereby giving greater effect to Section 31(b)(i) than the existing situation. The proposed objective also gives effect to higher order documents (NZCPS and RPS), which require a risk-based approach to the management of natural hazards (as previously identified). The proposed objective takes a risk-based approach to the management of natural hazards and sets the level of acceptable risk to be achieved from future development. The proposed objective allows for Council to meets it requirements under the LURP 2013, Waimakariri District Development Strategy 2018, and CDEM Group Plan by taking a risk based approach to the management of natural hazard risk.
	Reasonableness: The proposed objective will impose additional costs on the community as some sites will not be able to be developed further or to the same extent as currently and other developments will need to incorporate mitigation measures to

Proposed Objective	Appropriateness to achieve the purpose of the RMA
	ensure that the impacts from natural hazards are reduced to an acceptable level. However, this needs to be considered in relation to the risk to life and property that can arise from undertaking development within areas susceptible to natural hazards. Development which does not take into account the natural hazard risk has the potential to have significant health and safety impacts and well as economic costs from the resulting damage. Overall, it is considered that the costs of the proposed objective on the community are justifiable, although some properties will be more impacted than others.
	Achievability: Land use planning and subdivision decisions are one of the methods that councils have available to manage the risks associated with natural hazards and it is a fundamental consideration under the RMA. As such, the proposed objective can be realistically achieved within Council's power, skills and resources

Infrastructure

Existing Objectives (status quo)	Appropriateness to achieve the purpose of the RMA
There are currently no objectives for infrastructure within the natural hazard overlays	**Relevance:** As there is no objective within the District Plan for infrastructure within the natural hazard overlays, it means that the existing District Plan is not addressing a relevant resource management issue. As such, the lack of an objective is not considered to be consistent with Section 5 and 6(h) of the Act nor give effect to the CRPS.
	Reasonableness: The lack of an objective means that Council is unable to meet it requirements under Section 31(b)(i) of the Act. The lack of an objective can also result in economic impacts on local communities and infrastructure providers as a result of damage to infrastructure as it is not being appropriately designed for the natural hazard or by increasing the impacts of the hazard onto the neighbouring properties (i.e. through flood water displacement)
	Achievability:

Existing Objectives (status quo)	Appropriateness to achieve the purpose of the RMA
	There is no existing objective to be achieved and as such this matter is unable to be assessed.

Proposed Objective	Appropriateness to achieve the purpose of the RMA
NH-O2 Infrastructure in natural hazard overlays For infrastructure within natural hazard overlays: 1. existing infrastructure can be upgraded, maintained and replaced; 2. new non-critical infrastructure does not increase the risk to life or property from natural hazard events and is designed to maintain its integrity and ongoing function during and after natural hazard events, or is easily replaced. 3. critical infrastructure is avoided in high hazard flooding areas, unless there is a functional need or operational need for the location or route.	**Relevance:** The proposed objective gives effect to Part 2 of the RMA: - as it provides for the sustainable management of the District by ensuring infrastructure is designed to avoid or mitigate the impacts of the natural hazard, which in turn provides for the social, economic and cultural well-being of the local community as well as their health and safety. - Section 6(h) - as it sets the risk outcomes for infrastructure that are sought to be achieved from future development in the natural hazard overlays. The proposed objective also assists Council with undertaking its functions under s.31 of the Act. The proposed objective is encompassing as it applies to a variety of natural hazards, thereby giving greater effect to Section 31(b)(i) than the existing situation. The proposed objective also gives effect to higher order documents (NZCPS and CRPS), which require: - a risk-based approach to the management of natural hazards (as previously identified); and - for critical infrastructure to avoid high hazard areas; and - for development of land to avoid the risk to infrastructure. The proposed objective responds and gives effect to this higher order direction.
	Reasonableness: The proposed objective will impose additional costs onto infrastructure providers as there will be an increased need to obtain resource consent within the identified natural hazard overlays when certain conditions are not met. However, this additional cost needs to be balanced with the societal costs that arise from infrastructure failure due to it not being appropriately designed to address the natural hazard.

Proposed Objective	Appropriateness to achieve the purpose of the RMA
	The societal costs in these instances will be significantly greater than the direct costs to infrastructure providers being required to obtain resource consent. Overall, it is considered that the proposed objectives will not give rise to an unjustifiability high costs on infrastructure providers. The objective is reasonable because it gives effect to higher-order policy direction.
	Achievability: The outcomes of the proposed objective is achievable through Council's RMA functions as well as Local Government documentation such as Asset Management Plans.

Natural Hazard Mitigation

Existing Objectives (status quo)	Appropriateness to achieve the purpose of the RMA
Natural hazard mitigation (Objective 8.2.1) 'The community's desired level of protection from flood events is achieved through an appropriate combination of measures to modify the level of flooding, modify susceptibility to damage and deal with the consequences of floods.	Relevance: The provision is relevant, but does not deal with the impacts of the mitigation measures on the environment, many of which occur adjacent to the rivers or in the coastal environment. As such, the objective is not considered to be consistent with Section 6(a), (b), (c) and (d). It is also recognised that this objective only applies to flooding. However, the District is also susceptible to coastal inundation. This objective does not currently specifically address this hazard.
	Reasonableness: While achieving flood protection is desirable, this is not reasonable if the adverse effects on the environment from the mitigation is not addressed.
	Achievability: The outcomes of the existing objective is achievable through Council's RMA functions as well as Local Government documentation such as Asset Management Plans.

Proposed Objective	Appropriateness to achieve the purpose of the RMA
	Relevance:

Proposed Objective	Appropriateness to achieve the purpose of the RMA
NH-O3 Natural hazard mitigation Adverse effects on people, property, infrastructure and the environment resulting from methods used to manage natural hazards are avoided or, where avoidance is not possible, mitigated.	The proposed objective gives effect to Part 2, Sections 5 and 6 (h) of the RMA as it provides for natural hazard mitigation, but also the consideration of the effects of this mitigation. The proposed objective also assists Council with undertaking its functions under s.31 of the Act. The proposed objective is encompassing as it applies to all natural hazards, thereby giving greater effect to Section 31(b)(i) than the existing objective. The proposed objective also gives effect to higher order documents (NZCPS and CRPS), which require the consideration of adverse effects from hazard mitigation works.
	Reasonableness: The proposed objective may impose additional costs onto mitigation providers as there is an increased need to obtain resource consent. However, this additional cost needs to be balanced with the environmental costs that arise from the mitigation structures not being appropriately designed. Overall, it is considered that the proposed objective will not give rise to an unjustifiability high costs on mitigation providers. The objective is reasonable because it gives effect to higher-order policy direction.
	Achievability: The outcomes of the proposed objective is achievable through Council's RMA functions as well as Local Government documentation such as Asset Management Plans.

Natural defences

Existing Objectives (status quo)	Appropriateness to achieve the purpose of the RMA
There are currently no objectives for the retention, enhancement, or protection of natural defences for natural hazard purposes.	**Relevance:** As there is no objective within the District Plan for the retention, enhancement, or protection of natural defences for natural hazard purposes within the Natural hazard overlays, it means that the existing District Plan is not addressing a relevant resource management issues. As such, the lack of an objective is not considered to be consistent with Section 5 and 6(h) of the Act nor give effect to the NCPS or the CRPS.
	Reasonableness:

Existing Objectives (status quo)	Appropriateness to achieve the purpose of the RMA
	The lack of an objective means that Council is unable to meets it requirements under Section 31(b)(i) of the Act. This lack of objective also means that there is the potential for natural defences to be removed, without a consideration to the function that they play in avoiding or mitigation natural hazard risk. As such, there can be an increase in risk to life and property as a result of their removal.
	Achievability: There is no existing objective to be achieved and as such this matter is unable to be assessed.

Proposed Objective	Appropriateness to achieve the purpose of the RMA
NH-04 Natural defences Natural defences and systems are maintained to reduce the susceptibility of people, communities and property and infrastructure from natural hazard events.	**Relevance:** The proposed objective gives effect to Part 2 of the Act: - Section 5 - as it provides for the sustainable management of the District by retaining, protecting and enhancing existing natural defences which reduce the impacts from natural hazards. Retaining, protecting and enhancing these existing natural defences provides for the social, economic and cultural well-being of the local community as well as their health and safety. - Section 6(h) - through retaining, protecting and enhancing existing natural defences it assists with reducing the risk to people and property from natural hazards. The retention of these natural defences is an important tool in the management of natural hazard risk. The proposed objective also assists Council with undertaking its functions under s.31 of the Act. The retention, protection and enhancement of natural defences are an important option that avoids and mitigates some of the impacts from natural hazards. This objective gives effect to NZCPS Policy 26. The technical reports have identified that natural defences such as the sand dunes and coastal vegetation are important in providing protection to private properties from damage from natural hazards. The proposed objective recognises this importance and seeks to ensure these features are retained.

Proposed Objective	Appropriateness to achieve the purpose of the RMA
	The proposed objective also gives effect to policy 11.3.6 of the Canterbury Regional Policy Statement for the role of natural defences in reducing the consequences from natural hazards.
	Reasonableness: The proposed objective will not impose unjustifiably high costs on the community. Natural defences are also identified under other documents (for example New Zealand Coastal Policy Statement for dunes) as being required to be retained, protected or improved. As such, there is a strong directive within other planning documents to retain these defences. The proposed objective adds to the considerations that already exist within the other planning documents to ensure that their role in terms of natural hazard mitigation are also assessed within the resource consent process. The objective is clear, with little uncertainty. The proposed objective has implications for a number of properties in the Coastal environment. However, the wider implications and potential coastal hazard impacts as a result of the loss of the protective function provided by natural defences means that the private costs borne by the impacted properties by retaining these features will be less than the wider economic impacts from the loss of the protective values of these natural defences. It is considered that the risk of not retaining, protecting or enhancing natural defences that have a natural hazard mitigation function is greater than retaining these features. It is therefore considered that the proposed objective has an acceptable level of uncertainty and risk.
	Achievability: Land use planning decisions reflect one of the fundamental tools that councils have available to manage the risks associated with natural hazards and it is a fundamental consideration under the RMA. Natural defences are often easily identifiable on site, and on aerial photography and can be retained through a range of RMA (conditions) or non RMA (covenants) tools. As such, the proposed objectives can be realistically achieved within Council's power, skills and resources.

7.2 Summary - Evaluation of Proposed Objectives

The proposed objectives are the most appropriate way to achieve the purpose of the Act and to give effect to higher order direction because they take a risk-based approach to the management of

development and natural hazards and sets the outcomes that are expected from development and infrastructure within the natural hazard overlays. The proposed objectives use wording that is consistent with Section 6(h) of the RMA, NZCPS and CRPS. The objectives also support the Council to carry out its functions under s31(1)(a) and s31(1)(aa) of the Act.

The proposed objectives build on the strategic directions SD-O6 by setting the thresholds that development within the natural hazard overlay need to achieve.

It is considered that the status quo does not achieve the same consistency with the higher order documentation as the proposed objectives. As such the status quo is considered to not be the most appropriate option to give effect to the RMA.

8. EVALUATION OF PROPOSED POLICIES AND METHODS

Section 32 (1)(b) of the RMA requires an evaluation of whether the proposed policies and methods are the most appropriate way to achieve the proposed objectives by identifying other reasonably practicable options, assessing the efficiency and effectiveness of the proposed policies and methods in achieving the objectives, and summarising the reasons for deciding on the proposed policies and methods.

The level of detail undertaken for the evaluation of the proposed policies and methods has been determined by the preceding scale and significance assessment.

The assessment must identify and assess the benefits and costs of environmental, economic, social and cultural effects that are anticipated from the implementation of the proposed policies and methods, including opportunities for economic growth and employment.

The assessment must, if practicable, quantify the benefits and costs and assess the risk of acting or not acting if there is uncertain or insufficient information available about the subject matter.

Policies and methods have been evaluated as a package, as together they address a particular issue and seek to meet a specific objective.

8.1 Evaluation of Proposed Policies and Methods

8.1.1 Infrastructure in natural hazard overlays

Proposed Policies and Methods to achieve the objectives for natural hazards	**Benefits** Environmental, economic, social and cultural effects anticipated	**Costs** Environmental, economic, social and cultural effects anticipated	**Efficiency and Effectiveness**	**Risk of acting / not acting** If there is uncertain or insufficient information about the subject matter of the provisions
<u>Policies:</u> NH–P1 to NH-P9 NH-P16, NH-P18, and NH-P19. Maps – Mapping the various hazard extents. Section 5 of this assessment outlines the policies and rules in detail. To summarise these provisions, these policies and rules relate to the development on Natural hazard sensitive activities in the Natural hazard overlays. The policies provide the detail around what	**Environmental:** No direct or indirect environment benefits with the proposed provisions have been identified.	**Environmental:** No direct or indirect environmental costs have been identified with the proposed provisions.	**Efficiency** The proposed provisions are considered to be the most efficient in achieving the proposed objectives because: • They give effect to higher order direction (Section 6(h), NZCPS and CRPS) through a clear, transparent and consistent framework that is located within the District Plan. • While the proposed provisions will result in some additional economic costs, it is considered that the resulting benefits to future occupants and the recovery of the District following a natural hazard event outweigh these costs. It	It is considered that there is certain and sufficient information on which to base the proposed policies and methods as: • The expert assessments provided show that there are a number of natural hazards that affect the District and some pose a significant risk to life and property. • The expert assessments also show that for each natural hazard, the severity of the hazard varies within each overlay. As such, an approach is
	Economic: <u>Direct benefits</u> • Reducing the risk for damage to future developments from natural hazard events as a result of incorporated mitigation measures. • Likely ability to retain insurance cover for future properties as they have been able to be designed to mitigate the risks from natural hazards. • Reduced costs to recover from natural hazards (such as clean-up, repairing damage, loss of productivity).	**Economic:** The following economic costs have been identified: • There will be increased costs to developments as a result of the need to incorporate mitigation measures into some development forms. These costs may not be significant in the context of the overall development costs as many of the proposed measures would include matters such as: o Increased floor heights		

outcomes development in the differing hazard areas need to achieve. Generally, as the natural hazard risk increases, so do the resource consent requirement. These policies and rules also address community and private hazard mitigation works.	• Communities that experience less damage in a natural hazard event are able to recover faster. This ensures significantly reduced economic impacts from when a natural hazard event occurs as the loss of productivity and employment opportunities are not as significant. • The proposed provisions allow for development within the existing urban area to still occur, providing appropriate hazard mitigation measures are incorporated into the development. This assists people in the urban area to provide for their economic well-being. • There will be less consenting costs for the implementation of flood management works as these are provided for within the proposed provisions. • Within the flood assessment and coastal inundation overlays, there is the potential for private property owners to realise development opportunities on their respective sites following the implementation of mitigation works (as the works may have removed or reduced the	o Setting buildings back from high and medium hazards areas o Having buildings that are relocatable. These measures are easily able to be incorporated into developments at the time of construction, without presenting significant additional costs. • For some property owners there will be an opportunity cost from reduced ability to develop their property due the hazards present on the site. These opportunity costs could be significant. • There may be increased pressure on Waimakariri District Council to reduce the extents of the natural hazard overlays through the construction of engineering measures. This may result in increased rates through the District to pay for these additional costs.	is also noted that the additional costs to a development to incorporate mitigation measures into the design are often considerably less than the costs that result from damage (or repeated damage) from a natural hazard event. • The proposed provisions would assist with the transfer of costs for addressing natural hazard risk from future property owners and local and central government onto developers at the time the developments are undertaken. However, as identified above, these costs are appropriate as they are less than the costs arising from damage from a natural hazard event. • The proposed provisions reduce the consenting requirements for community scale hazard mitigation works. This is in recognition of the significant benefits that they provide to the community. The provisions allow for these	required that reflects the level of risk and identifies where in high hazard areas development should be avoided. In low and medium hazard areas, development should be able to proceed, providing measures are implemented that mitigate the risk from the hazard. • The proposed provisions are consistent with higher order direction. • The proposed provisions allow Council to undertake its function under Section 31(b)(i) of the RMA; • New Zealand has experienced a significant number of large natural hazard events in the last decade (Christchurch Earthquake Sequence,

	flood hazard on the property to the extent it can be developed). <u>Indirect benefits</u> • Potentially lower future costs to respond to natural hazard events as they have been planned for. This includes events like sea level rise and flooding which are affected by climate change. This has the potential for reduced increasing rates of insurance premiums, reduced Council rates increases (to pay for mitigation to reduce the impacts from natural hazards); • Flood mitigation works can be implemented more quickly, which should reduce the time that properties are exposed to flood hazards and the potential damage experienced in these events. • Dwelling prices may retain their values as the result of being able to retain insurance for longer.		programs of work to be delivered more efficiently. • It is recognised that there are potential costs to be borne by tangata whenua. Careful consideration was given to whether an alternative framework was required to allow for the cultural aspirations of these communities to be met. However, this was decided against due to the higher order direction and that being more permissive in the natural hazard overlays could put life and future developments at considerable risk, which would result in worse outcomes for these communities in the longer term. **Effectiveness** The proposed provisions are considered to be the most effective in achieving the proposed objectives because: • They give effect to higher order direction (Section 6(h), NZCPS	Kaikoura Earthquake, Gisborne Floods, Dunedin Floods, West Coast Floods and Southland Floods, Nelson/Tasman, Canterbury Floods and Lake Ohau wildfires). There have been significant social and economic costs from these events. Some of these costs could have been avoided if there had been better recognition of natural hazard risks when some of the impacted communities were developed. The proposed provisions seek to ensure that future development is undertaken in a manner to ensure that these future social and economic costs do not continue to increase. • The proposed subdivision provisions assist with the
	Social: <u>Direct benefits</u> • Purchasers of new properties that are located in natural hazard overlays should have mitigation measures built in to ensure that the	**Social:** No direct or indirect social costs have been identified with the proposed provisions.		

	development is not significantly affected by future natural hazard events up to the identified design level. This will reduce the potential for future social costs such as stress, strain on mental health, illness and loss of work days. • The construction of buildings that respond to the natural hazard risk will make them less susceptible to damage during a natural hazard event, therefore increasing the safety of the occupants, and reducing the social impacts that come from natural hazard events. <u>Indirect benefits</u> No indirect benefits have been identified.		and CRPS), which the proposed objectives also respond to. • The proposed provisions relate to the natural hazards that have the potential to have the greatest impact within the Waimakariri District. • The activity status and the regulatory response associated with the proposed provisions are directly proportionate to risk to development from a natural hazard. • The proposed provisions take a consistent approach across the various natural hazards. This approach is also consistent between differing development typologies. This means that subdivisions for the purposes of accommodating residential dwellings in natural hazard overlays will need to go through the same considerations as constructing a second dwelling (i.e. there is no loophole to work around the provisions); and • The proposed policies and rules will ensure there is no continued increase in the	implementation of Section 106(1) and (1a) of the RMA, which gives the ability for Councils to decline subdivision applications if there is a Significant Natural Hazard Risk. This allows for a more consistent and transparent consideration of subdivision applications than the existing situation. • The proposed provisions allow Council to meets its requirements under the 2013, Waimakariri District Development Strategy 2018 and CDEM Group Plan, by providing a risk-based approach to the management of natural hazard risk.
	Cultural: <u>Direct benefits</u> No direct cultural benefits have been identified with the proposed provisions	**Cultural:** <u>Direct costs</u> It is recognised that the proposed provisions may impact on tangata whenua aspirations to further develop their land, and where development is possible, increased costs may occur. However, it is understood that tangata whenua accept that the response to and management of natural hazards is		

		equally applicable to development of Māori land and descendent land within Māori Reserve 873.	natural hazard risk experienced by residents of Waimakariri District as a result of either discouraging development in high hazard areas or by requiring mitigation measures to address the risk from the natural hazard. • The proposed provisions recognise the benefit of community scale hazard mitigation works and allows for these to be delivered more effectively for less cost.	

Opportunities for economic growth and employment

The proposed provisions cover the parts of the District affected by natural hazards as identified in the updated technical information. However, the proposed provisions recognise the importance of the urban environments, and the associated economic, social and cultural benefits. In this regard, the framework for the urban environments is more permissive and those developments that incorporate appropriate mitigation measures to reduce the consequences from the natural hazard, and do not transfer the risk to adjoining properties, should be able to proceed. Therefore the proposed provisions still provide for employment and economic opportunities in the District.

In the non-urban environments, many of the proposed provisions are new and will introduce new costs to development. However, the framework still provides for development in the vast majority of the rural area, except for development in the high flood hazard areas (which geographically represents a small area of the District), where further intensification is avoided, unless land works are undertaken such that the area is no longer identified as a high flood hazard area. While for the properties in the high flood hazard area, the new provisions represent a loss opportunity cost, this needs to be viewed in the context of development within these areas presenting an unacceptable risk to life and property. Overall, it is considered that the proposed provisions do not result in a measurable impact on employment and economic growth in the District because the main economic centres of the District are not located within the non-urban environments.

Quantification

Section 32(2)(b) requires that if practicable the benefits and costs of a proposal are quantified. A cost benefit analysis in relation to flooding has been undertaken. This cost benefit analysis included the following scenario:

- Change the building requirements so that new developments will be less vulnerable because of the height of the building relative to flood levels.

This scenario is reflected in the proposed rules. The cost/benefit analysis for this scenario demonstrated that the benefits derived from the provisions significantly outweigh the resulting costs.

For the remainder of the provisions and given the assessment of the scale and significance of the proposed changes above it is considered that quantifying costs and benefits would add significant time and cost to the s32 evaluation processes. The evaluation in this report identifies where there may be additional cost(s), however the exact quantification of the benefits and costs discussed was not considered necessary, beneficial or practicable.

Options less appropriate to achieve the objective

Option B: Status Quo	**Benefits** Environmental, economic, social and cultural effects anticipated	**Costs** Environmental, economic, social and cultural effects anticipated	**Efficiency and Effectiveness**	**Risk of acting / not acting** If there is uncertain or insufficient information about the subject matter of the provisions
Policies: 8.1.1.1 8.1.1.2 8.2.1.1 to 8.2.1.1.7 8.3.1.1	**Environmental:** No direct or indirect environmental benefits have been identified with the existing provisions.	**Environmental:** No direct or indirect environmental costs have been identified with the existing provisions.	**Efficiency** The status quo is considered to not be the most efficient means for achieving the proposed objectives for the following reasons: • It does not give full effect to higher order direction (Section 6(h), NZCPS and CRPS). While there is a number of properties, where natural hazard rules apply, there is also a significant number of properties within the District, where the existing rules are	It is considered that there is certain and sufficient information on natural hazards. It is considered the risk of not acting and retaining the status quo are significant for the following reasons: • The research undertaken to inform the natural hazard chapter shows that Waimakariri District is susceptible to a
	Economic: The Operative District Plan has rules for flooding. <u>Direct Benefits</u> <u>Areas where the rules apply:</u> For the properties for which these rules apply, there are a number of economic benefits including:	**Economic:** The existing provisions have a range of costs. These costs vary depending on whether the site is located within the area of the District, where the existing natural hazard rules apply, or whether the site is located outside of the area where the rules apply. The		

	• Reducing the potential damage to future properties and developments from natural hazard events as a result of incorporated mitigation measures. • Likely ability to retain insurance cover for future properties as they have been able to be designed to mitigate the risks from natural hazards. • Reduced costs to recover from natural hazards (such as clean-up, repairing damage, loss of productivity). • Communities that experience less damage in a natural hazard event are able to recover faster. This ensures significantly reduced economic impacts from when a natural hazard event occurs as the loss of productivity and employment opportunities are not as large or significant. • The proposed provisions allow for development within the urban area to still occur, providing appropriate hazard mitigation measures are incorporated into the development. This assists with people in the urban area to provide for their economic well-being.	economic cost assessment considers both of these scenarios. <u>Areas where the rules apply:</u> The following direct economic costs have been identified: • There will be increased costs to developments as a result of the need to incorporate mitigation measures into some development forms (for example the current areas of the District where flood hazard rules apply). • For some property owners there are loss opportunity costs from not being able to develop their property or reduced development potential due the hazards present on the site. These lost opportunity costs could be significant. <u>Areas where the rules do not apply:</u> A range of development can continue within areas that experience natural hazards with no consideration of the potential risks. As a result, the risk within areas susceptible to natural hazards is increasing with time. When a	not applicable. In these instances where resource consent is needed for an activity, where there are no specific natural hazard rules, it means that the resource consent process has to be used to give effect to this higher order documentation. This can result in non-compliances that have no linkages to the higher order documentation, but elevate the application to discretionary or higher status being used as levels to allow for the consideration of the higher order requirements. This is a very opaque, unclear process that transfers significant costs onto applicants, is inconsistently applied and can result in developments being designed to the lower consenting thresholds (permitted – restricted discretionary activity status) to prevent this from occurring (even though the overall environmental outcomes may be poorer by	number of natural hazards. The current provisions do not address a number of these natural hazards in large areas of the District and as such development could still occur in these areas with little or no regard to the natural hazard risk, unless identified through a resource consent process. • The District Plan provisions would remain somewhat inconsistent with higher order direction (Section 6(h), NZCPS and the CRPS), particularly in the areas where the existing rules do not apply. As such, the risk to the community from natural hazards as a result of development occurring in areas

	<u>Areas where the rules do not apply:</u> The flood hazard layer only impacts properties in and around the main towns in Waimakariri, and for large areas of the District (mainly in rural areas) there are no rules for flooding. For these areas, the main economic benefits associated with the existing provisions are as follows: • There are no costs associated with having to build in mitigation measures into developments to reduce natural risks. • The existing provisions allow for these sites to be intensified allowing for land owners to realise economic value from their properties. For some individual properties the realised benefits could be significant due to the value of land (several hundreds of thousands of dollars). • There are some employment benefits with the existing provisions which are directly associated with the aforementioned point. The creation of vacant lots has the following employment benefits associated with development:	natural hazard event occurs, the impact on the communities will be greater when compared to the proposed provisions (due to more exposure) and the direct economic costs include: • More individual property owners being affected by natural hazard events as a result of increased development occurring in natural hazards zones without any consideration of the natural hazard impacts and the costs associated with recovering, repairing damage, replacing furnishings and rebuilding as a result of damage from a natural hazard event. • Increased insurance premiums or loss of insurance for individual properties that are at high risk of being affected by future natural hazard events. • Reduced productivity arising from disruption following a natural hazard. If businesses are impacted then this can reduce economic growth and employment options. • Increased insurance costs (potentially) being passed	designing to a lower activity status). **Effectiveness** The existing provisions (policies and rules) are considered to not be the most effective means for achieving the objectives for the following reasons: • They do not give full effect to higher order direction (Section 6(h), NZCPS and CRPS). • They have different spatial applicability and some areas that are susceptible to natural hazards are not covered by the existing rule framework. This means that the risk from natural hazards in the District is being addressed unevenly within the District Plan and is resulting in some situations where it is appropriately managed and some other situations where the risk is increasing. • The main District Plan rules that apply to fault rupture and liquefaction, apply at the time of subdivision. However, if no subdivision is proposed, then	susceptible to natural hazards, with no mitigation measures, will increase. This includes risk to life and property damage. • There will be increased community disruption and economic costs borne by those affected properties owners and communities, which is not covered by the existing framework from future natural hazard events. • There will be continued transfer of economic gain from developers onto future property owners, and local and central government from future natural hazard events, particularly in the areas of the District not covered by the existing rule framework. This has

	o Professional services creating the lot; o Construction of any services and resulting dwellings; and o Selling and marketing of the property. <u>Indirect benefits</u> <u>Areas where the rules apply:</u> For those properties within the existing flood assessment overlays, the indirect economic benefits from the existing provisions includes: • Potential lower costs to respond to future natural hazard events as they have been planned for. This includes events like sea level rise and flooding which are affected by climate change. This has the potential for reduced increases in rates of insurance premiums and reduced Council rates increases (to pay for mitigation to reduce the impacts from natural hazards). • Dwellings may retain their values as the result of being able to retain insurance for longer. <u>Areas where the rules do not apply:</u> For those properties not located within the existing flood assessment overlays,	through the market (all properties) to recover the settlements that have been made (or loss of insurance for properties in similar situations as those that were impacted which has implications for house prices). • Potential increased costs through rates arising as a result of public and political pressure to construct engineered mitigation measures to reduce the impact from the natural hazard event. • Potential reduction in house prices as a result of an inability to obtain insurance or insurance premiums being too high (banks require insurance to settle on property transactions). • Increased costs at the time of application for resource consent for planned mitigation works as the rule framework of the District Plan does not directly enable these activities. As a result, large detailed applications with a number of specialist inputs are required to cover all potential	there are no provisions (outside of Pegasus township) that address these hazards. This means that there is a potential loophole in the District Plan (which is where a land use activity could proceed a subdivision consent without the need to consider the natural hazard risk). This loophole reduces the potential effectiveness of the subdivision rules. • For those areas not covered by the existing District Plan policy and rule framework, Council is having to rely on other pieces of legislation (e.g. Building Act 2004 and CDEM Act 2002) to try and address the risks associated with natural hazards. However, this is less efficient than addressing the natural hazard risk at resource consent stage and it means not all relevant natural hazards are being addressed.	the potential for wider economic costs being borne by the Waimakariri District through increased insurance premiums and rates (to pay for hazard mitigation works).

	the only indirect economic benefit identified is that the Council receives additional rates from the increased housing supply, which provides additional revenue to the Council to then spend in the District.	environmental effects as there is no direction on the District Plan for the consideration of hazard mitigation measures undertaken by public bodies. • Potential increase in costs for the construction of planned mitigation works due to the timeframes required to get through the resource consent process.		
	Social: <u>Areas where the rules apply:</u> For the areas where the existing policies and rules apply, there are the following social benefits from the existing framework: • The risk from natural hazard events will being managed. As such, purchasers of properties that are located in natural hazard overlays should have mitigation measures built in to ensure that the development is not significantly affected by future natural hazard events up to the identified design level. This will reduce the potential for future social costs such as	**Social:** The existing provisions have the following direct social costs: • There are increased social costs for those properties not covered by the natural hazard rules associated with the time for people and communities to recover from natural hazard events. This includes stress, strain on mental health, illness and loss of work days due to repairing damage. • There can be a loss of community connectiveness as people and businesses move out of impacted affected communities.		

	stress, strain on mental health, illness and loss of work days. • The construction of buildings that respond to the natural hazard risk makes them less susceptible to damage during a natural hazard event, therefore increasing the safety of the occupants, and reducing the social impacts that come from natural hazard events. <u>Areas where the rules do not apply:</u> For the areas of the District where the existing rules do not apply is that as the existing provisions allow for intensification of existing properties. This allows for a supply of residential dwellings, which in the short to medium term provides social benefits. However, these benefits can be negated if these dwellings are significantly affected by natural hazard events.	• Loss of life risks if in buildings on fault lines.		
	Cultural: No cultural benefits have been identified with the status quo	**Cultural:** No cultural costs have been identified with the status quo		
Opportunities for economic growth and employment				
The existing provisions do not significantly constrain economic growth or employment. They allow for development to proceed within the identified hazard areas, providing minimum floor levels are met. For those properties not located within a hazard area, land use development can generally proceed in accordance with the zone				

requirements, without needing to consider the natural hazard risk. There are some employment benefits with the existing provisions which are directly associated with the aforementioned point. The creation of vacant lots can have the associated employment benefits associated with development including:

- Professional services creating the lot;
- Construction of any services and resulting dwellings; and
- Selling and marketing of the property.

However, for those properties not located within a natural hazard overlay, when a natural hazard event occurs, there is the potential for the buildings to be significantly affected by the hazard. This may mean that there is a longer recovery period, which can have significant employment and economic costs. These costs are considered to be greater than the benefits derived from the proposed works.

Overall summary

Having considered the proposed provisions and the status quo, it is considered that the proposed provisions are the most efficient and effective way to achieve the objectives. The proposed provisions get more restrictive as the risk from natural hazards increases, thereby ensuring that a nuanced approach to the management of natural hazard risk occurs. The proposed provisions give effect to higher order direction and provide a clear framework for the consideration of development within natural hazard overlays. It is recognised that for high flood hazard areas in urban environments the emphasis is on mitigation as opposed to avoidance. The reason for this is because the CRPS allows for avoidance or mitigation. Given the nature of the hazard, being flooding, it is considered that for many development forms, the risk from the hazard can be mitigated through development design. It is also recognised that setting the starting point at mitigation as opposed to avoidance still allows for development within the urban environments and therefore the resulting social, cultural and economic benefits derived from continued growth in these areas can be realised. However, development in the high flood hazard areas in urban environments is a restricted discretionary activity. This means that, if the risk from the hazard cannot be appropriately mitigated for a particular development, then the increased risk could be avoided by declining the application. As such, this proposed framework has a number of economic and social benefits which are considered to outweigh the resulting costs. The status quo however is ineffective and inefficient, and does not give effect to higher order direction. The existing provisions allow for a number of developments to occur within areas that are susceptible to natural hazard risk with little consideration of addressing the resulting risk. As a result, the risk to the District from development in areas susceptible to natural hazard overlays is slowly increasing, which has significant potential future economic and social costs, with very little resulting benefits. It is therefore considered that the status quo is not appropriate to achieve the outcome of the proposed objectives.

8.1.2 Infrastructure in natural hazard overlays

Proposed Policies and Methods	**Benefits** Environmental, economic, social and cultural effects anticipated	**Costs** Environmental, economic, social and cultural effects anticipated	**Efficiency and Effectiveness**	**Risk of acting / not acting** If there is uncertain or insufficient information about the subject matter of the provisions
Policies: NH–P10 to NH-P14 Section 5 of this assessment outlines the policies and rules in detail. To summarise, these policies and rules relate to the installation of infrastructure within the Natural hazard overlays. These policies and rules set differing thresholds for both critical and non-critical infrastructure in the differing Natural hazard overlays. The General approach is as the critical nature of the infrastructure increases, along with the hazard present by the natural hazard, then the	**Environmental:** No direct or indirect environment benefits have been identified with the proposed provisions. **Economic:** Direct benefits The direct economic benefits derived from the proposed provisions include: • Reduced damage to future infrastructure from natural hazard events as a result of incorporated mitigation measures. • Reduced costs to recover from natural hazards (such as repairing damage, loss of productivity). • Communities that experience less disruption in a natural hazard event are able to recover faster. This ensures	**Environmental:** No direct or indirect environmental costs have been identified with the proposed provisions. **Economic:** Direct costs The following direct economic costs have been identified: • There will be increased costs to infrastructure providers as a result of the need to incorporate mitigation measures into new infrastructure within the natural hazard overlays. These costs may not be significant in the context of the overall infrastructure development costs as many of the proposed measures would include matters such as:	**Efficiency** The proposed provisions are considered to be the most efficient in achieving the proposed objectives because: • They give effect to higher order direction (Section 6(h), and RPS) through a clear, and consistent framework that is located within the District Plan. • While the proposed provisions will result in some additional economic costs, it is considered that the resulting benefits to future occupants and the recovery of the District following a natural hazard event outweigh these costs. It is also noted that the additional costs to infrastructure to incorporate mitigation measures into the design are	It is considered that there is certain and sufficient information on which to base the proposed policies and methods as: • The expert assessments provided show that there are a number of natural hazards that affect the District and that some of the potential impacts represent a significant risk to infrastructure. • The expert assessments also show that for each natural hazard, the severity of the hazard varies within each overlay. As such, a nuanced approach is required where in high hazard areas critical infrastructure generally needs to be avoided, whereas in low and medium hazard areas new infrastructure should be able to proceed providing appropriate mitigation measures are

resource consent requirement gets more onerous to ensure that infrastructure is appropriately located and design to address the natural hazard risk.	significantly reduced economic impacts from when a natural hazard event occurs as the loss of productivity and employment opportunities are not as large or significant. • The proposed provisions still largely allow for the installation and upgrading of infrastructure and the installation of non-critical infrastructure. This assists within ensuring that infrastructure providers being able to continue to provide their services, with a degree of certainty with the associated positive economic impacts that they have.	o Ensuring the infrastructure is above the flood height; o Having redundancy built into the infrastructure in case of failure; o Avoiding being located in the high hazard areas. • There will be a greater requirement to go through the resource consent process when compared to the status quo. As such, there will be the direct costs associated with this process.	often considerably less than the costs that result from damage (or repeated damage) from a natural hazard event. • The proposed provisions do not require all infrastructure to obtain resource consent, rather it focuses on key infrastructure, including critical infrastructure, which if damaged in a natural hazard event, would have consequences for the community which it supports. **Effectiveness** The proposed provisions are considered to be the most effective in achieving the proposed objectives because: • They give effect to higher order direction (Section 6(h), and RPS), which the proposed objectives also respond to; • The proposed provisions relate to the natural hazards that have the potential to have the greatest impact	implemented to address the risk from the hazard. • Higher order guidance (Section 6(h), and CRPS) provides direction on how natural hazard risk to infrastructure needs to be managed and addressed within District Plans. The proposed provisions are consistent with this higher order direction; • The proposed provisions allow Council to undertake its function under Section 31(b)(i) of the RMA; • The existing District Plan provisions could result in an increase in risk with time to infrastructure as they currently have little consideration of natural hazards. As such, the status quo is not a realistic option and new provisions (as proposed) are required to give effect to higher order direction; • New Zealand has experienced a significant number of large natural hazard events in the last decade (Christchurch Earthquake Sequence, Kaikoura
	Social: <u>Direct benefits</u> The construction of infrastructure that responds to the natural hazard risk will make them less susceptible to damage during a natural hazard event, therefore reducing the social	**Social:** No direct or indirect social costs have been identified		

	impacts that come from natural hazard events.		within the Waimakariri District; • They reflect hazard risk in relation to infrastructure, where the activity status of the consent and the resulting direction provided within the policy is directly relative to the risk presented by the development; • The proposed approach ensures that, infrastructure in the natural hazard overlays is designed to take into account the hazard to ensure that it is able to continue operation following a natural hazard event.	Earthquake, Gisborne Floods, Dunedin Floods, West Coast Floods and Southland Floods). There has been significant social and economic costs from these events. Some of these costs could have not been avoided if there had been better recognition of natural hazard risks when infrastructure for the impacted communities was installed. The proposed provisions seek to ensure that future infrastructure in is undertaken in a manner to ensure that these future social and economic costs do not continue to increase.
	Cultural: No direct or indirect cultural benefits have been identified with the proposed provisions	**Cultural:** No direct or indirect cultural costs have been identified with the proposed provisions		
Opportunities for economic growth and employment				
The proposed provisions do not prevent economic growth or employment. While the proposed provisions will mean that more resource consents will be required for new infrastructure, if it can be demonstrated that the natural hazard impacts on the infrastructure have been addressed, then resource consent is likely to be granted. It is considered that by building resilience into the infrastructure networks, it will mean that the disruption to the community following a natural hazard event will be less. While it is acknowledged that in any given year there is a low likelihood of a significant natural hazard event occurring, when considered over a long time period, it is considered that the proposed provisions have stronger positive economic growth and employment opportunities than the existing provisions.				
Quantification				
Section 32(2)(b) requires that if practicable the benefits and costs of a proposal are quantified. Given the assessment of the scale and significance of the proposed changes above it is considered that quantifying costs and benefits would add significant time and cost to the s32 evaluation processes. The evaluation in this report identifies where there may be additional cost(s), however the exact quantification of the benefits and costs discussed was not considered necessary, beneficial or practicable.				

Options less appropriate to achieve the objective				
Option B: Status Quo	**Benefits** Environmental, economic, social and cultural effects anticipated	**Costs** Environmental, economic, social and cultural effects anticipated	**Efficiency and Effectiveness**	**Risk of acting / not acting** If there is uncertain or insufficient information about the subject matter of the provisions
There are no policies in the utilities chapter for natural hazards.	**Environmental:** No direct or indirect environmental benefits have been identified with the existing provisions.	**Environmental:** No direct or indirect environmental costs have been identified with the existing provisions.	**Efficiency** The status quo is considered to not be the most efficient means for achieving the objectives for the following reasons: • They do not give effect to higher order direction (Section 6(h) and CRPS). The lack of rules means that when permitted infrastructure is undertaken, there is no District Plan requirement to reduce natural hazard risk. In the instance where resource consent is needed for infrastructure, where there is no specific natural hazard rules, it means that the resource consent process has to be used to give effect to this higher order documentation. This can	It is considered that there is certain and sufficient information on natural hazards. It is considered the risk of not acting and retaining the status quo are significant for the following reasons: • Research and recent experience show that the District is subject to a range of natural hazards. The existing provisions would allow for the installation of infrastructure to occur without any consideration of the natural hazard risk. This has the potential to have significant impacts on the community if infrastructure was inappropriately located or designed for the relevant natural hazard and failed during or after an event occurred. • The District Plan provisions would remain inconsistent with
	Economic: The District Plan only has infrastructure natural hazard provisions within the rules that apply to the Pegasus township. As such, one direct economic benefit is that there are no costs associated with having to build in mitigation measures into infrastructure to reduce natural risks. The other economic benefit to infrastructure providers is that there are reduced resource consent costs as there is no requirement to get resource consent for infrastructure	**Economic:** The main economic cost from the existing provisions is the cost to infrastructure providers, and communities from infrastructure being either damaged or destroyed as a result of a natural hazard event. This is a low likelihood economic outcome, the costs have the potential to be very significant and enduring. In certain instances, the economic costs from the failure of infrastructure due to a natural hazard event could be measured through a drop in the District's Gross Domestic Product.		

	located within the identified natural hazard overlays.		result in non-compliances that have no linkages to the higher order documentation, but elevate the application to discretionary or higher status being used as levels to allow for the consideration of the higher order requirements. This is a very opaque, process that transfers significant costs onto applicants, is inconsistently applied and results in infrastructure being designed to the lower consenting thresholds (permitted – restricted discretionary activity status) to prevent this from occurring (even though the overall environmental outcomes may be poorer by designing to a lower activity status). **Effectiveness** The existing provisions are considered to not be the most effective means for achieving the objectives for the following reasons:	higher order direction (Section 6(h), and RPS). • There could be increased community disruption and economic costs borne by affected properties owners and communities from infrastructure failing as a result of being constructed in an area susceptible to natural hazards without a consideration of the hazard.
	Social: The only direct social benefit that has been identified is that the existing provisions are permissive and therefore allow for the installation of new infrastructure more rapidly than if they had to proceed through a resource consent process. However, this benefit can be negated if the infrastructure is damaged in a natural hazard event.	**Social:** The existing provisions have the following direct social costs: • If infrastructure is damaged as a result of being located in an area susceptible to a natural hazard, and the infrastructure is critical for maintaining life safety or health and well-being, then there can be significant social costs as a result of failure, including harm or fatalities. • There are increased social costs associated with the time for people and communities to recover from natural hazard events. This includes stress, strain on mental health, illness and loss of work days due to businesses and home life being disrupted while infrastructure repairs are undertaken.		
	Cultural:	**Cultural:**		

	No cultural benefits from the status quo have been identified.	No cultural costs from the status quo have been identified.	• They do not give effect to higher order direction (Section 6(h) and CRPS); • There are no polices or rules within the District Plan that applies to infrastructure being located within areas susceptible to natural hazards. As such, the existing District Plan has no methods to achieve the proposed objective.	
Opportunities for economic growth and employment				
The existing provisions have the potential for economic growth and employment through the provision of infrastructure in areas susceptible to natural hazards, with little need for regulatory approval which considers the resulting impact on the infrastructure from natural hazards. While the provision of this infrastructure has the potential to foster employment and economic growth, this can be negated when a natural hazard event occurs, which damages the infrastructure. While has a low likelihood of occurring in any given year, the resulting employment and economic consequences from damage to the infrastructure can be significant. It is considered that these adverse consequences means that when considering the District as the economic development over a long time period, these existing provisions do not have as positive economic and employment opportunities as they would initial appear.				

8.1 Overall summary

Having considered the proposed provisions and the status quo, it is considered that the proposed provisions are the most appropriate way to achieve the objective. The proposed provisions ensure that certain forms of infrastructure are designed to address the natural hazard risk as well as ensuring that their installation is not transferring risk onto adjacent properties. The proposed provisions give effect to high order direction and provide a clear framework for the consideration of infrastructure development within natural hazard overlays. This framework has a number of economic and social benefits which are considered to outweigh the resulting costs. The status quo however is ineffective and inefficient, and does not give effect to higher order direction. The existing provisions allow infrastructure to be installed with little or no consideration to the natural hazard risk and whether these risks are being displaced onto neighbouring properties. It is therefore considered that the status quo is not appropriate to achieve the outcome of the proposed objectives.

8.1.3 Natural hazard mitigation

Proposed Policies and Methods	**Benefits** Environmental, economic, social and cultural effects anticipated	**Costs** Environmental, economic, social and cultural effects anticipated	**Efficiency and Effectiveness**	**Risk of acting / not acting** If there is uncertain or insufficient information about the subject matter of the provisions
<u>Policies:</u> NH-P9 NH-P15 NH-P17 Section 5 of this assessment outlines the policies and rules in detail. To summarise these provisions, these policies and rules relate to soft engineer and hard engineering measures within the coastal environment. These polices and rules allow for soft engineering measures as a permitted activity. However, hard engineering measures require resource consent as a discretionary activity	**Environmental:** <u>Direct benefits</u> • The use of planting has little impact on the natural environment. • Soft engineering uses natural products to reduce the impacts of coastal erosion and thereby reducing the impact on the receiving environment. • Some soft engineering measures (dune restoration, replanting, etc) have improved the ecological function of the local environment and therefore have a positive environmental benefit. • The framework for hard engineering includes the consideration of the impact of the works on natural processes, thereby ensuring that the impacts of these future works on the natural systems and processes are reduced.	**Environmental:** No direct or indirect environmental costs have been identified with the proposed provisions.	**Efficiency** The proposed provisions are considered to be the most efficient in achieving the proposed objectives because: • They give effect to higher order direction (Section 6(h), NZCPS and CRPS) through a clear and transparent framework that is located within the District Plan. • They provide a permissive framework for planned flood mitigation and soft engineering works which reduces the costs and timeframes with the implementation of these works, while allowing for the community benefits to be more effectively realised.	It is considered that there is certain and sufficient information on which to base the proposed policies and methods as: • It is well documented that hard engineering measures can have an adverse impact on coastal processes and can accelerate erosion and transfer risk to adjacent properties. The proposed provisions seek to ensure that this outcome does not arise as a result of future development within Waimakariri. • Natural defences provide important buffer and protection to private properties from

and the policy provides guidance around the matters than need to be considered within these applications.			• They provide a framework for the consideration of hard engineering measures. This consideration also includes the transfer of private cost onto the public realm through beach loss and changes in coastal processes within the resource consent framework, with an outcome sought of ensuring that the transfer of these costs is minimised. • They better provide for the upgrading of existing structures which have an existing impact and works undertaken by the Crown, Regional Council and the District Council which provide community benefits. **Effectiveness** The proposed provisions are considered to be the most effective in achieving the proposed objectives because:	coastal hazards. While the research for the Waimakariri coastline shows a long-term trend of aggradation, this does not mean there may not be damage as a result of one-off storm events or a distal tsunami. The proposed provisions ensure the natural hazard protection of natural defences are retained, protected and enhanced to reduce the potential for significant damage to private properties. • Higher order guidance (RPS and NZCPS) provides direction on how hard and soft engineering measures are to be addressed within District Plans.
	Economic: <u>Direct benefits</u>	**Economic:** <u>Direct costs</u>		

	• There will be less costs associated with the implementation of soft engineering solutions within the coastal environment as these are provided for within the proposed provisions. • There is greater certainty to regionally significant infrastructure providers who are installing measures to protect their infrastructure in terms of the assessment of their resource consent applications through the direction provided for in NH-P17. This reduces the compliance and consent costs for these projects by providing a clear pathway for these projects to be assessed against. <u>Indirect benefits</u> • The provisions for soft engineering measures allow for these to be implemented more rapidly, reducing damage to public and private infrastructure. • The framework for consideration of hard engineering measures should ensure that the rate of beach loss and edge effects from these future works are not accelerated when compared to the existing situation. This reduces the potential development of a feedback cycle, where private properties are being impacted to a greater extent by natural	• Increased costs to private property owners who seek to construct sea walls or other hard engineering solutions as these will need to be tested in the resource consent process. However, unlike the existing District Plan, Policy NH-P17 provides guidance on the effects and matters that need to be considered within these applications. <u>Indirect costs</u> • Some private hard engineering measures may not be able to obtain resource consent approval. As such, there could be indirect economic costs from loss of property value, sunk costs in the resource consent process. However, these indirect costs should only be borne if the hard engineering measures are unable to meet the outcomes sought under NH-P17. • There are no direct or indirect costs to employment opportunities as a result of the proposed provisions in relation to this matter.	• They give effect to higher order direction (Section 6(h), NZCPS and CRPS), which the proposed objectives also respond to; • They ensure planned soft engineering measures that have significant benefit on the existing communities are provided for, thereby reducing the cost and uncertainty with these projects and allowing for the benefits to be rapidly realised following a coastal erosion event. • When soft engineering measures are the preferred option in the coastal environment, the proposed provisions also provide a framework for the consideration of hard engineering measures. This framework sets tests for both the protection of regional significant infrastructure as well as private properties. This provides greater certainty	

	hazard events (as natural buffers have been lost) resulting in greater damage from these events and the need to install large private engineering systems to prevent future damage (which can exasperate the problem and result in a feedback loop).		to all parties on how applications for hard engineering measures will be considered.	
	Social: The social benefits of the proposed provisions are as follows: • They could result in recreational land and beaches not being lost as a result of hard engineering structures. • The ability to implement soft engineering measures by local and central government agencies will allow for temporary protective measures to be installed rapidly following a coastal hazard event, thereby providing a sense of comfort to adjacent landowners. • Soft engineering measures have the potential to also provide recreational opportunities (for examples dunes, beach nourishment), which have social benefits.	**Social:** No direct or indirect social costs from the proposed provision have been identified.		
	Cultural: Natural defences often have cultural and spiritual values and are also often valued by the community. The proposed provisions	**Cultural:** There could be direct costs from consenting if the iwi chose to install hard engineering measures to address coastal		

	will allow for the retention and restoration of these features, which will have positive cultural benefits.	hazards to protect existing sites and buildings of cultural value. However, given the coastline is generally aggrading, these costs may never be realised.		
Opportunities for economic growth and employment				
The proposed provisions neither provide nor inhibit economic growth of development. This is due to their limited geographic extent to which they will apply and that there is very little economic growth or employment within the identified coastal environment.				
Quantification				
Given the assessment of the scale and significance of the proposed changes above it is considered that quantifying costs and benefits would add significant time and cost to the s32 evaluation processes. The evaluation in this report identifies where there may be additional cost(s), however the exact quantification of the benefits and costs discussed was not considered necessary, beneficial or practicable.				

Options less appropriate to achieve the objective

Option B: Status Quo	**Benefits** Environmental, economic, social and cultural effects anticipated	**Costs** Environmental, economic, social and cultural effects anticipated	**Efficiency and Effectiveness**	**Risk of acting / not acting** If there is uncertain or insufficient information about the subject matter of the provisions
<u>Policies:</u> There are no policies for retaining natural defences for the purposes of natural hazard mitigation in the existing District Plan. However, it is noted that there are policies for	**Environmental:** The current policy framework provides for the maintenance and enhancement of the natural character of the coastal environment.	**Environmental:** In the coastal environment the use of hard engineering measures can have a direct impact on the environmental values of the local environment through beach loss, and the increase in erosion at the edges of hard engineering structures. The degradation of these features through	**Efficiency** The status quo is considered to not be the most efficient means for achieving the objectives for the following reasons: • It does not give effect to higher order direction	In regard to coastal hazard works, the status quo does not provide any guidance on these works and as a result both soft and hard engineering measures are considered in absence of a framework. It is feasible

retaining the natural character and ecological values of the coastal environment. **<u>Rules:</u>** None currently exist		hard engineering can result in a loss in hazard protection. The existing rule framework does not protect natural defences in the coastal environment. As such, there is the potential for a number of permitted activities to occur which results in the degrading to the natural defences.	(Section 6(h), NZCPS and RPS). This means that the resource consent process has to be used to give effect to this higher order documentation. This can result in non-compliances that have no linkages to the higher order documentation, but elevate the application to discretionary or higher status being used as levels to allow for the consideration of the higher order requirements. This is a very opaque, unclear process that transfers significant costs onto applicants, is inconsistently applied and results in developments being designed to the lower consenting thresholds (permitted – restricted discretionary activity status) to prevent this from occurring (even though the overall environmental outcomes may be poorer	that seawalls will not require resource consent as they are not considered to be a building, whereas soft engineering measures like sacrificial fill require resource consent as they exceed the earthworks volumes. As a result, a raft of unintended outcomes could result from the status quo, including significant environmental, social and economic costs to a range of parties. The risk of not acting is that this cost could be realised. While it is recognised that there are benefits to private individuals from these sea walls, they also have the ability to worsen the effects on seaside properties over time as a result of continued beach loss (which is an important buffer against wave energy). In this regard the benefits derived from the sea walls may only exist in the short to medium term, while transferring the
	Economic: In the coastal environment the main economic benefit is to private property owners where they are able to construct hard engineering measures (seawalls) to reduce the erosion of their respective property. These seawalls often do not require resource consent as they do not meet the definition of a building under the District Plan.	**Economic:** <u>Direct costs</u> No direct economic costs have been identified. <u>Indirect costs</u> • Potential for damage to public and private properties due to the costs and uncertainty associated with the implementation of soft engineering measures within the coastal environment. • In the coastal environment, beach loss and the reduction in natural systems (dunes) can result in private properties being impacted to a greater extent by natural hazard events (as natural buffers have been lost) resulting in greater damage from these events and the need to install large private engineering systems to prevent future damage (which can exasperate the		

		problem and result in a feedback loop).	by designing to a lower activity status); • Within the coastal environment there is a potential transfer of private costs (protecting private properties) onto the public domain through the loss of public recreational space (beaches and parks). **Effectiveness** The status quo is considered to not be the most effective means for achieving the objectives for the following reasons: • It does not give effect to higher order direction (Section 6(h), NZCPS and RPS); • In the coastal environment the lack of direction in the District Plan allows for private ad-hoc engineering solutions to be constructed (some may not even require resource consent), which in turn can have significant effects on the	costs into the public realm from the loss of public space. As such, the risk of not acting is that the status quo will remain and these costs and impacts will continue. It is considered these cost and impacts borne by the community and other parties are greater than the existing benefits derived from the status quo.
	Social: <u>Direct benefits</u> • The ability for private property owners to be able to construct sea walls to protect their own property from coastal erosion. This provides the social benefit of temporarily addressing the issue and reduced concern from loss of private land. • There is also the potential for improved public access to the coast line through engineering measures. However, given the nature of the development along the Waimakariri coastal, this benefit is considered marginal.	**Social:** <u>Direct costs</u> • Loss of recreation land and natural buffers (both beaches and public reserve land) as a result of hard engineering structures that could result in beach loss and increased erosion at the edges. • Increased concern in the community during storm events due to increased damage, erosion and effects from these events.		
	Cultural: Natural defences often have cultural and spiritual values and are also often valued by the community. The status quo allows for the retention of these systems, albeit for natural character and ecological reasons as opposed to their natural hazard mitigation function. The retention of these features has positive cultural outcomes.	**Cultural:** No direct or indirect cultural costs have been identified.		

			surrounding public and private spaces. These private hard engineering solutions can also accelerate coastal erosion if they are incorrectly designed, resulted in a significant feedback loop. As such, the status quo is not effective at addressing the issue of coastal erosion. • The rule framework does not align with the policy direction within the District Plan. As such, there is the potential for natural defences and buffer to be removed as a permitted activity.	
Opportunities for economic growth and employment				
The existing provisions neither provide nor inhibit economic growth of development. This is due to their limited geographic extent to which they will apply and that there is very little economic growth or employment within the identified coastal environment.				

Overall summary

Having considered the proposed provisions and the status quo it is considered that the proposed provisions are the most efficient and effective way to achieve the objectives. The proposed provisions provide for soft engineering measures and provide a clear framework for the consideration of hard engineering measures. This framework has a number of economic, environmental and social benefits which are considered to outweigh the resulting costs. The status quo however is ineffective and inefficient at delivering soft engineering works and for addressing the effects from hard engineering measures. This in turn is

resulting in significant costs to a range of parties, with very little resulting benefits. It is therefore considered that the status quo is not appropriate to achieve the outcome of the proposed objectives.

8.1.4 Natural defences

Policy and method options to achieve the District Plan objectives relating to NH-O4 **<u>Policies:</u>** NH-P15	**Costs** environmental, economic, social and cultural effects anticipated,	**Benefits** environmental, economic, social and cultural effects anticipated,	**Efficiency and Effectiveness**	**Risk of acting / not acting** if there is uncertain or insufficient information about the subject matter of the provisions
	Environmental: No direct or indirect environmental costs have been identified with the proposed provisions.	**Environmental:** The proposed provisions have the following direct environmental benefit: • The proposed provisions ensure the protection of natural features which have associated amenity, ecological and natural character values.	***Efficiency*** The proposed provisions are considered to be the most efficient in achieving the proposed objectives because: • They give effect to higher order direction (Section 6(h), NZCPS and RPS) through a clear and transparent framework that is located within the District Plan. • They ensure that natural features that have a hazard mitigation role are retained and not lost through future development. ***Effectiveness***	It is considered that there is certain and sufficient information on which to base the proposed policies and methods as: • Natural features provide important buffer and protection to private properties from coastal hazards. While the research for the Waimakariri coastline shows a long-term trend of aggradation, this does not mean there will not be coastal effects as a result storm events or a distal tsunami. The proposed provisions ensure the natural hazard protection of natural features are retained to reduce the potential for significant damage to private properties. • Higher order guidance (RPS and NZCPS) provides direction on the protection of natural features within District Plans and this framework responds to this direction.
	Economic: The direct economic costs of the proposed provisions include: • If the natural features are located on private properties, there may be some direct economic costs associated with the lost	**Economic:** The direct economic benefits of the proposed provisions include: • There will be less costs associated with the implementation of engineering solutions to		

	potential to developed land, or the improvement of these natural features to enhance their natural hazard mitigation value. <u>Indirect costs</u> • The removal of natural features from a site may not be able to obtain resource consent approval. As such, there could be indirect economic costs from loss of property value, sunk costs in the resource consent process. There are no direct or indirect costs to employment opportunities as a result of the proposed provisions in relation to this matter.	replace the removal of natural features that provide this role. <u>Indirect benefits</u> • The framework should ensure that edge effects from these future works are not accelerated when compared to the existing situation. This reduces the potential development of a feedback cycle, where private properties are being impacted to a greater extent by natural hazard events (as natural buffers have been lost) resulting in greater damage from these events and the need to install large private engineering systems to prevent future damage (which can exasperate the problem and result in a feedback loop).	The proposed provisions are considered to be the most effective in achieving the proposed objectives because: • They give effect to higher order direction (Section 6(h), NZCPS and RPS), which the proposed objectives also respond to. • They ensure planned soft engineering measures that have significant benefit on the existing communities are provided for, thereby reducing the cost and uncertainty with these projects and allowing for the benefits to be rapidly realised following a coastal erosion event. • When soft engineering measures are the preferred option in the coastal environment, the proposed provisions also provide a framework for the consideration of hard	
	Social: No direct or indirect social costs from the proposed provision have been identified.	**Social:**		

		The social benefits of the proposed provisions are as follows: • It allows for the retention of natural features which often have an amenity or recreational value associated with them, which people experience and utilise. • It ensures that properties protected by natural features from the impacts of natural hazards, continue to enjoy this protection.	engineering measures. This framework sets tests for both the protection of regional significant infrastructure as well as private properties. This provides greater certainty to all parties on how applications for hard engineering measures will be considered.	
	Cultural: No direct social costs have been identified	**Cultural:** Natural features often have cultural and spiritual values and are also often valued by the community. The proposed provisions will allow for the retention and restoration of these features, which will have positive cultural benefits.		
Option B: Status Quo	**Benefits** environmental, economic, social and cultural effects anticipated,	**Costs**	**Efficiency and Effectiveness**	**Risk of acting / not acting**

Policies: There are no policies for retaining natural features for the purposes of natural hazard mitigation in the existing District Plan. However, it is noted that there are policies for retaining the natural character and ecological values of the coastal environment. **Rules:** None currently exist		environmental, economic, social and cultural effects anticipated,		if there is uncertain or insufficient information about the subject matter of the provisions
	Environmental: The status quo policy framework seeks to maintain and enhance the natural character of the coastal environment.	**Environmental:** The existing rule framework does not protect natural features in the coastal environment. As such, there is the potential for a number of permitted activities to occur which results in the degrading to the natural features.	***Efficiency*** The status quo is considered to not be the most efficient means for achieving the objectives for the following reasons: • It does not give effect to higher order direction (Section 6(h), NZCPS and RPS). This means that the resource consent process has to be used to give effect to this higher order documentation. This can result in non-compliances that have no linkages to the higher order documentation, but elevate the application to discretionary or higher status being used as levels to allow for the consideration of the higher order requirements. This is a very opaque, unclear	• The status quo does not require the consideration of the change in affect from natural hazards as a result of removing natural features. This means that to achieve this outcome, it has to be argued that there is a natural character reason for keeping the feature. This reliance on another value to achieve a natural hazard mitigation outcome is difficult and as a result, a raft of unintended outcomes could result from the status quo, including significant environmental, social and economic costs to a range of parties. The risk of not acting is that these costs could be realised. • While it is recognised that there are benefits to private individuals from potentially being able to remove natural features without the need for resource consent, the removal of these features could, in time, require the construction of public defence systems to replace the protection function that these natural features previously had. In this regard the benefits derived from the loss of natural features may only exist in the
	Economic: The main economic benefit is to private property owners where they can remove natural features that have a natural hazard mitigation role, without the need to consider the hazard impact of the removal of these features through a resource consent process.	**Economic:** <u>Direct Costs</u> The direct effects of the status quo include: • There are no direct economic costs associated with the status quo. <u>Indirect Costs</u> • The loss of natural features can result in private properties being impacted to a greater extent by natural hazard events (as natural buffers have been lost) resulting in greater damage from these		

		events and the need to install large private engineering systems to prevent future damage (which can exasperate the problem and result in a feedback loop).	process that transfers significant costs onto applicants, is inconsistently applied and results in developments being designed to the lower consenting thresholds (permitted – restricted discretionary activity status) to prevent this from occurring (even though the overall environmental outcomes may be poorer by designing to a lower activity status); • Within the coastal environment there is a potential transfer of private costs (protecting private properties) onto the public domain through the loss of natural features which currently provide this protection. ***Effectiveness*** The status quo is considered to not be the most effective means for achieving the	short to medium term, while transferring the costs into the public realm in the form of community defence systems. As such, the risk of not acting is that the status quo will remain and these costs and impacts will continue. It is considered these cost and impacts borne by the community and other parties are greater than the existing benefits derived from the status quo.
	Social: Direct benefits There are no social benefits associated with the status quo.	**Social:** Direct Costs The status quo could have the following social costs: • Loss of recreation land and natural buffers as a result of land development and the loss amenity and recreational values that are associated with these buffers. • Increased concern in the community during storm events due to increased damage from these events.		
	Cultural: There are no direct cultural benefits from the status quo.	**Cultural:** Direct effects Often natural features have a cultural value associated with their existence. The lack of a rule framework around these existing natural features means that they can be lost,		

		which can have a resulting cultural impact.	objectives for the following reasons: • It does not give effect to higher order direction (Section 6(h), NZCPS and RPS); • The rule framework does not align with the policy direction within the District Plan. As such, there is the potential for natural features and buffer to be removed as a permitted activity.	

Overall summary

Having considered the proposed provisions and the status quo it is considered that the proposed provisions are the most appropriate way to achieve the objectives. The proposed provisions provide for the protection of existing natural features that reduce the impacts of natural hazards. This framework has a number of economic, environmental and social benefits which are considered to outweigh the resulting costs. The status quo however is ineffective and inefficient at delivering the protection of these natural features. This in turn is resulting in significant costs to a range of parties, with very little resulting benefits. It is therefore considered that the status quo is not appropriate to achieve the outcome of the proposed objectives.

8.1.1 Summary - Evaluation of Proposed Policies and Methods

Having reviewed the cost and benefits of the proposed provisions, and the status quo it is considered that the proposed provisions are the most effective and efficient way to achieve the objectives. The reasons for this include:

- They give effect to higher order direction, particularly section 6(h) of the RMA, NZCPS, and the CRPS;
- They cover the areas of the District that are affected by natural hazards and therefore have a more comprehensive approach to the management of natural hazard risk in the District, than the existing provisions;
- They cover a wider range of natural hazards and ensure that the main hazards that impact the District are covered by an RMA regulatory approach;
- The proposed provisions do not introduce a significant cost to development, and for a number of development scenarios, there is a permitted activity pathway, providing the conditions are met;
- The proposed provisions will not unduly negatively impact employment opportunities or economic growth in the District and would have positive impacts in time due to reduced disruption to businesses and less damage from natural hazard events;
- The proposed provisions ensure the risk from natural hazards will not significantly increase in time and will ensure that the health and safety, economic and social wellbeing of communities is provided for, by having developments which have mitigation measures to reduce or remove the consequences from natural hazards.

For the reasons above, the proposed provisions are the most efficient and effective way to achieve the objectives.

9. SUMMARY

This Section 32 report evaluates a variety of objectives, policies and rules to address the risk associated with natural hazards. The proposed provisions have been developed to address the main hazards that impact Waimakariri District and to give effect to the relevant higher order direction.

The Proposed District Plan provisions take a risk-based approach to the management of natural hazard risk. They set differing consent categories for identified Natural hazard sensitive activities, relative to the consequence that the various natural hazard present. The proposed provisions seek to ensure the following outcomes are achieved:

- Urban Area – The risk is managed through mitigation measures to future development.
- Non-urban environments – In low and medium hazard areas, risk to future development is managed through mitigation measures and is avoided in high hazard areas.

The proposed provisions have been considered under Section 32 of the Act and are considered to be the best way to meet the purpose of the Act.

Appendix 1 – List of relevant scientific and technical reports

Hazard	Title and Author	Summary
Flood	**Waimakariri District Localised Flood Hazard Assessment 2015** - Project Delivery Unit, Waimakariri District Council, July 2015. https://www.waimakariri.govt.nz/__data/assets/pdf_file/0017/19313/Waimakariri-District-Localised-Flood-Hazard-Assessment-July-2015.pdf	• Updates the previous 2014 Localised Flood Hazard Assessment. • Flood effects modelled across the District for the 1%, 0.5% and 0.2% AEP[1] (i.e. 100, 200 and 500 ARI[2]) events. • Area modelled includes the full district north and south of the Ashley River, with only the Lees Valley catchment upstream of the Ashley Gorge not included, due to insufficient ground data being available.
	Waimakariri District Localised Flood Hazard Assessment 2015 – appendices. https://www.waimakariri.govt.nz/__data/assets/pdf_file/0018/19314/Waimakariri-District-Localised-Flood-Hazard-Assessment-July-2015-Appendices.pdf	• Includes sea level rise of 1.0m and a 16% increase in rainfall volume. • Modelling was not robust enough for setting floor levels in urban environments, and continued compliance with the Building Act (1 in 50 yr level of protection) recommended instead. • Results are considered suitable for assessing flood hazard at a districtwide level, for planning purposes when considering the suitability of land for development and for inclusion on LIMs.
	Waimakariri District flood hazard management strategy: **Ashley River floodplain investigation** - Environment Canterbury, 2008 https://www.waimakariri.govt.nz/__data/assets/pdf_file/0017/19142/WAIMAKARIRI-DISTRICT-FLOOD-HAZARD-MANAGEMENT-STRATEGY-ASHLEY-RIVER-FLOODPLAIN-INVESTIGATION.PDF *Note the updated report below*	• Modelling of the Ashley River Floodplain to estimate flood extent and depths. • Breakout scenarios onto the floodplain modelled for the 1%, 0.5% and 0.2% AEP (i.e. 100, 200 and 500 year ARI) events. • Modelling indicates the current capacity of the Ashley River stopbanked system is approximately equivalent to a 2% AEP (50 year return period) flood event. • Design flows did not specifically include allowance for climate change, but sensitivity analysis of the predicted 0.5m (mid-range) sea level rise (by 2100) undertaken. • Modelling of a range of breakout scenarios at a 0.5% AEP shows flood depths in the existing

[1] Annual Exceedance Probability
[2] Average Recurrence Interval

Hazard	Title and Author	Summary
		urban area of Kaiapoi, north of the river, of up to 0.8m. Flood depths in the Waikuku area are typically 1-1.5m. • The 0.2% AEP scenario results in over four times more water on the floodplain that the 1% AEP event. • In the 0.2% AEP event a large part of Kaiapoi and adjacent areas are classified as high hazard, due to ponded depths over 1m.
	Ashley River floodplain investigation - 2016 update - Environment Canterbury.	• Update of the 2008 work, using LiDAR data from 2014 and accounting for changes to flood protection and drainage (i.e. the new stopbank adjacent to Rangiora). • Breakout modelling conducted for the 1%, 0.5% and 0.2% AEP (i.e. 100, 200 and 500 year ARI) events. • Modelling found that the current capacity of the Ashley River stopbank system is in the range of a 2% to 1% AEP (50 to 100 year ARI) event. • Flow and water depth information produced can be used for land use planning and setting of minimum floor levels for new dwellings located on the floodplain. • Design flows do not specifically include an allowance for climate change. However, a sensitivity test with breakout flows increased by 20% was modelled to show the sensitivity of the model to breakout flow magnitudes. • Sea level rise of 0.8m modelled. • A large proportion of Kaiapoi meets the definition of a high hazard area (as defined by the CRPS) in a 0.2% AEP (500 year ARI) event.
	Economic Impact Assessment – Flood Hazard - Covec & T+T, 2018.	• Conducts a cost benefit analysis of four options for managing flood hazard risk to input into the District Plan review process. Options assessed are: 1. Retain the status quo; 2. Flood mitigation measures (stopbanks and raising ground levels); 3. District Plan controls; and

Hazard	Title and Author	Summary
		4. Building requirements to set minimum floor levels. • Considers 1%, 0.5% and 0.2 AEP events and effect of climate change using modelling by WDC in 2015 and Environment Canterbury in 2016. • Model results treated separately, as WDC deals with localised flooding and Environment Canterbury deals with breakout events. Therefore, results are not conservative, as both could occur in the same storm event. • Intangible benefits included in analysis (e.g. health and wellbeing). • The three options that address flood risk (i.e. excluding the status quo base option) will yield net benefits. • Largest benefit from infrastructural protection, which also has the highest level of investment.
	Groundwater Level Assessment Technical Report – Jacobs, 2018.	• Investigation into the expected effects of climate change and sea level rise on groundwater level and salinity, to inform the District Plan Review. • Objectives are to guide potential future restriction, management or avoidance of activities, as well as the use, development and maintenance of Council-owned land and infrastructure. • Provides an initial assessment of the likely impact of sea level rise on groundwater levels within the coastal zone, based on latest climate change scenarios. • Study being undertaken alongside an assessment of coastal inundation and erosion in the District, to address the Ministry for the Environment (2017) coastal hazards and climate change guidance. • Uses relevant information from groundwater studies conducted in Christchurch City. • Three key interacting processes impacting on groundwater variations:

Hazard	Title and Author	Summary
		1. The effective recharge of varying climate and rainfall patterns 2. Sea level rise 3. Abstraction and land use • 85th percentile chosen as the measure of high groundwater, consistent with similar work done for Christchurch. • Significant areas within 10km of the coast are predicted to have 85th percentile high groundwater levels at or near (within 2m) the ground surface. • Kaiapoi has significant areas with groundwater at or near the ground surface. • Sea level rise considered to pose a relatively low risk due to net accretion of river sediments, however could impact upon infrastructure, groundwater salinity etc. • RCP8.5 in 100 years (+1.06m) and RCP8.5+ in 130 years (+1.88m) scenarios used for comparison with current (2018) climate. • Findings: - Sea level rise will increase the areas at risk of groundwater at or near the surface, in particular to the southeast of Kaiapoi, behind the dune system from Waikuku to Pines Beach and in Tuahiwi (southwest of Woodend) - Saline interface will move inward by between 10-80m (+1.06m SLR), or 15-160m (+1.88m SLR) – relatively small movement. Max movement predicted in the south of the District. • Limitations: - Model designed to represent regional scale changes in groundwater. - Steady state modelling approach that does not include explicit representation of tidal influences and other shorter term increases in sea level. - Does not account for variations in rainfall or abstraction. • Environment Canterbury is developing a groundwater model for the Waimakariri

Hazard	Title and Author	Summary
		groundwater zone, which is expected to supersede the steady state modelling done for this report.
	Other Environment Canterbury Natural Hazard Reports North Canterbury flood hazards reports	Including: • Waimakariri District Flood Hazard Management Strategy, 2003; • Waimakariri River Floodplain Management Strategy – Secondary Stopbank Investigation, 2005; • Waimakariri Flood Protection Project, Hydraulic Modelling, 2007; • Middle Ashley (Rakahuri) (Gorge – the Okuku confluence) bed level investigation, 2013.
	Review of flood frequency across Canterbury - NIWA, 2011	Derives flood frequency by considering annual maximum flood peaks over the period 1930 to 2010.
	Flood Hazard Models Update District and Urban and MIKE FLOOD models DHI Water and Environment Ltd May 2020	• The modelling includes the two district wide MIKE 21 models, North Ashley and South Ashley and the local urban flood models for Woodend, Kaiapoi, Oxford and Rangiora townships. • The work involved updating existing models with the latest data and methodologies aiming to improve the accuracy in flood level predictions in the District. • The model identifies flood hazard risk and flood extents for low probability flood events, 1%, 0.5% and 0.2% AEP design rainfall events of a 24hr duration. The models also account for climate change using the HIRDS v4 RCP 8.5 rainfall. • Reviews the Ashley River breakout scenarios – the impact of 4 breakout areas from the Ashley River on a dry catchment (Phase 3a) and the same breakout areas on a wet catchment • The identification of the breakout points builds on the ECAN study *Ashley River Floodplain Investigations* – 2016 Update, Tony Oliver and Michelle Wild.

Hazard	Title and Author	Summary
		• The model was prepared using rainfall for the 10 year, 20 year and 50 year return period events using the HIRDS v4 rainfall depths with the 80 year RCP 8.5 climate change emissions scenario. The 24 hour nested storm profile and general methodology was the same as used in the District modelling. • The breakout scenarios show that the risk from a 1 in 100 year breakout scenario can be larger than the risk from the 1 in 100 year rainfall event when looking at the floodplain directly downstream of the breach locations
Flooding	**Ashley Breakout Scenarios Memo** from DHI Water and Environment Ltd to Antoinette Tan May 2020	• Reviews the Ashley River breakout scenarios – the impact of 4 breakout areas from the Ashley River on a dry catchment (Phase 3a) and the same breakout areas on a wet catchment • The identification of the breakout points builds on the ECAN study *Ashley River Floodplain Investigations* – 2016 Update, Tony Oliver and Michelle Wild. • The model was prepared using rainfall for the 10 year, 20 year and 50 year return period events using the HIRDS v4 rainfall depths with the 80 year RCP 8.5 climate change emissions scenario. The 24 hour nested storm profile and general methodology was the same as used in the District modelling. • The breakout scenarios show that the risk from a 1 in 100 year breakout scenario can be larger than the risk from the 1 in 100 year rainfall event when looking at the floodplain directly downstream of the breach locations
Fault Rupture and Earthquake Shaking	**General distribution and characteristics of active faults and folds in the Waimakariri District** - GNS Science, 2013. https://www.waimakariri.govt.nz/__data/assets/pdf_file/0015/19140/GENERAL-DISTRIBUTION-AND-CHARACTERISTICS-OF-ACTIVE-	• Desktop identification of approximate ground surface locations of active faults and folds in the Waimakariri District, and estimation of their degree of activity. • Regional geological mapping (1:250,000) detected 15 areas of definite or likely active faults or folds at the ground surface. Most active features are:

Hazard	Title and Author	Summary
	FAULTS-and-FOLDS-IN-WAIMAKARIRI-DISTRICT-NORTH-CANTERBURY-GNS-SCIENCE-CONSULTANCY-REPORT-20-12-326-ECAN-REPORT-R13-28-JULY-2013.PDF	- Lees Valley Fault - Knowles Top fault zone - Starvation Hill fault - Ashley fault zone. • Starvation Hill fault passes through Oxford township and more evaluation is required to determine if it is an active fault. • Ashley Fault is the only fault in District mapped in sufficient detail to allow for fault avoidance Overlay.
	Assessment of active fault ground deformation hazards associated with the Ashley Fault Zone - GNS Science, 2014. https://www.waimakariri.govt.nz/_data/assets/pdf_file/0016/19141/ASSESSMENT-OF-ACTIVE-FAULT-GROUND-DEFORMATION-HAZARDS-ASSOCIATED-WITH-ASHLEY-FAULT-ZONE-LOBURN-NORTH-CANTERBURY-GNS.PDF	• More detailed assessment of risk from Ashley Fault Zone in the Loburn area, near Rangiora, a rural lifestyle area with the potential for future development. • Based on desktop analysis and one day site examination, with no excavation or subsurface investigations. • Establishes Fault Avoidance Overlay(FAO) for the Ashley Fault Overlay. • Recurrence Interval for Ashley Fault uncertain and therefore two scenarios for resource consent activity status provided.
	Other Environment Canterbury Natural Hazard Reports Earthquake fault reports Earthquake shaking reports District earthquake hazard assessments https://www.ecan.govt.nz/technical-reports/	• Reports that pre-date the 2010-2011 Canterbury Earthquake Sequence (CES), and provides context to earthquake hazards in the District.
	Review of active fault information for the Waimakariri District GNS October 2019 https://openmaps.waimakariri.govt.nz/HazardsReports/Activefaultlinereview.pdf	• Reviews the new information that has become available since 2013, and refines the active fault and fold map for the Waimakariri District. • Sectors of the Lees Valley Fault have been positioned more accurately. • Improvements have been made to the interpretation of and map positioning of the Ellis Fault (north of the Oxford to Cust area).

Hazard	Title and Author	Summary
		• Removes the Rangiora monocline from the dataset (identified as formed by river action and not as anomalous topographically) • The Starvation Hill fault through Oxford township is a suspected by unproved active fault. Report notes that a definitive answer on this one would require specialist trenching investigation.
Liquefaction	**Review of liquefaction hazard information in eastern Canterbury** - GNS Science, 2012 https://www.waimakariri.govt.nz/__data/assets/pdf_file/0018/19143/review-of-liquefaction-hazard-information-in-eastern-canterbury-including-christchurch-city-and-parts-of-selwyn-waimakariri-hurunui-districts-report-R12-83.pdf	• Regional scale review of liquefaction hazard in Eastern Canterbury after the CES • Distinguishes land susceptible to liquefaction and lateral spreading from land where this damage is unlikely in future earthquakes. • Excludes urban environments that are covered by the Department of Building and Housing (DBH) Technical Categories. • Information intended to be used by territorial authorities for land use planning decision making. • Lithology investigations limited to 10m deep as uncertainties in groundwater model exceed any contribution to deformation from deeper materials. • Includes consideration of liquefaction susceptibility of ground alongside waterways.
Coastal Erosion and Inundation	**Coastal Erosion and Sea Water Inundation Assessment Technical Report** – Jacobs, 2018.	• Report on the extent of future coastal erosion and sea water inundation hazards including the effects of sea level rise and climate change over a 50 and 100 year timeframe to inform land use planning and the use, development and maintenance of Council-owned land and infrastructure in these areas. • Deterministic approach using actual measured shoreline change and accepted sea level rise scenarios (RCP4.5, RCP8.5 and RCP8.5+), with a conservative sensitivity approach to manage uncertainty. • Methodology meets the requirements of the NZCPS and CRPS and follows MfE (2017) guidance.

Hazard	Title and Author	Summary
		• Identified that the sediment supply from the Waimakariri River will exceed SLR induced erosion for over 100 years under all sea level rise scenarios (net accretion). • Therefore, seaward from the back of the dune system is an appropriate boundary from which to restrict development to protect the dune system and avoid coastal erosion hazards. • Report recommends that more complex hydrodynamic modelling be conducted for Kaiapoi, Kairaki-Pines and Waikuku as coastal inundation may occur in these areas due to sea level rise causing the overtopping of riverbanks.
Coastal Inundation	**Phase 2 Coastal Inundation Modelling Final Study Report** - Jacobs March 2020	• Report on the findings of the hydrodynamic model assessing the susceptibility of the coastal Waimakariri District to flooding from the Waimakariri and Ashley River mouths. • Modelling simulates: o for separate storm tide and fluvial events of 1%, 0.5% and 0.2% annual exceedance probabilities (AEPs) with an allowance of 1m rise in mean sea level; and o a storm tide event of 1% AEP and rises in mean sea level of 0m, 0.5m, 1.0m and 1.88m. • Overtopping of stop banks or natural river banks occurs in all the scenarios considered. • Overtopping occurs over the true left bank of the Kairaki Creek for all scenarios considered. The stop banks along the Kaiapoi River contain water in the river for all scenarios considered except for the 1% AEP event with 1.88m rise in mean sea level. • For the Ashley River, the key flood flow route on the true right side of the river is over the lower parts of the stop bank and natural river bank at the car park on Beach Crescent and between the car park and the Taranaki Stream outfall. On the true left side of the river, the spread of water from the Ashley

Hazard	Title and Author	Summary
		Saltwater Creek Estuary is largely determined by the natural topography of the area. Water spreads up the Saltwater Creek and under the SH1 bridge crossing. • Flood levels in the lowest reaches of the Waimakariri River (including the Kaiapoi River) and Ashley River, within the area where overtopping of defences occurs, are strongly influenced by rise in mean sea level. However, the effect diminishes upstream and particularly rapidly in the Ashley River. For both rivers, flood levels at the SH1 bridge crossings and further upstream are not influenced by sea level rise. • For the 1m sea level rise o In the Waimakariri River, flooding is more severe for a storm tide event of a given AEP than for a fluvial event of the same AEP, except for the smallest AEP considered (0.2%) for which flooding in the fluvial event is slightly more severe. o In the Ashley River, flooding on the true right bank is marginally deeper and more extensive in fluvial events than in storm tide events for the all the AEPs considered. On the true left side of the river, in and around the Ashley-Saltwater Creek Estuary, the flood extents and depths are slightly greater for storm tide events.
Tsunami	**Environment Canterbury Natural Hazard Report:** **Multiple scenario tsunami modelling for Canterbury** – GNS Science, 2019.	• Models tsunami inundation for the Canterbury coastline, including the Waimakariri River and Pegasus Bay. • Hydrodynamic modelling of multiple potential worst case (largest credible earthquake, i.e. 2500 year return period) scenarios. • Both distant and regional source contribute to the 'worst case' category, which is unusual. Possible reasons include: o Higher magnitudes for the distant and regional sources compared to the regional Hikurangi source;

Hazard	Title and Author	Summary
		o Effective radiation of tsunami energy towards Christchurch from particular sources; o A channelling effect of the Chatham Rise; o focusing effect of Pegasus Bay. • Results show that tsunami inundation could reach further inland than previously modelled. • Uncertainties include: o Modelled surface roughness; o Digital elevation and bathymetric models; o Variability of the modelled geometry of the rupture surface; o The sequence in which slip is triggered on that surface and the rake angle of individual slip patches; o Rigidity of the subduction interface and surrounding medium. • Results can be used to further refine evacuation zones, not land use planning.
	Review of tsunami evacuation zones for Christchurch City – Environment Canterbury, 2019.	• Based on the 2019 modelling by GNS Science (above) and 2018 modelling by NIWA, this report reviews the tsunami evacuation zones from the Waimakariri River mouth to Taylors mistake.
	Multiple scenario tsunami modelling for northern Pegasus Bay and northern Banks Peninsula bays – GNS Science Report 2020/136, November 2020	• Builds on and extends the modelling previously done for urban Christchurch and Selwyn District. • The modelling used tsunami's produced by earthquakes from a range of sources, local and Pacific-wide, including worst case scenarios for 3m and 5m wave heights. • Inundation simulations for northern Pegasus Bay also included the interaction between river flow of the major rivers (Waimakariri and Kaiapoi) and the impacting tsunami. • Both the Hikurangi and Pacific East ensemble show significant flow depths and inundation extent along the northern Pegasus Bay coast, although the Hikurangi ensemble floods more efficient in the north of this area (Hurunui

Hazard	Title and Author	Summary
		District coast) and the Pacific East ensemble has greater impact on the southern part of this area (the southern Waimakariri District coast). • That the distance and regional sources contribute to larger inundation extents than to local sources in Pegasus Bay is unusual compared to other parts of the New Zealand coast. There is not a large local source here such as Hikurangi. The largest tsunami source nearby is the Hikurangi subduction interface, but due to the travel times of greater than one hour this is classified as a 'regional source'.

Appendix 2 Canterbury Regional Policy Statement Provisions

Objective 6.2.1	***Recovery Framework*** *Recovery, rebuilding and development are enabled within Greater Christchurch through a land use and infrastructure framework that:* *…* *8. protects people from risk from natural hazards and the effects of sea-level rise;*
Policy 6.3.3	***Development in accordance with outline development plans*** *Development in greenfield priority areas and rural residential development is to occur in accordance with the provisions set out in an outline development plan or other rules for the area. Subdivision must not proceed ahead of the incorporation of an outline development plan in a district plan. Outline development plans and associated rules will:* *…* *11. Show how the adverse effects associated with natural hazards are to be avoided, remedied or mitigated as appropriate and in accordance with Chapter 11 and any relevant guidelines.*
Objective 11.2.1	***Avoid new subdivision, use and development of land that increases risks associated with natural hazards.*** *New subdivision, use and development of land which increases the risk of natural hazards to people, property and infrastructure is avoided or, where avoidance is not possible, mitigation measures minimise such risks.*
Objective 11.2.2	***Adverse effects from hazard mitigation are avoided or mitigated*** *Adverse effects on people, property, infrastructure and the environment resulting from methods used to manage natural hazards are avoided or, where avoidance is not possible, mitigated.*
Objective 11.2.3	***Climate change and natural hazards*** *The effects of climate change, and its influence on sea levels and the frequency and severity of natural hazards, are recognised and provided for.*
Policy 11.3.1	***Avoidance of inappropriate development in high hazard areas*** *To avoid new subdivision, use and development (except as provided for in Policy 11.3.4) of land in high hazard areas, unless the subdivision, use or development:* *1. is not likely to result in loss of life or serious injuries in the event of a natural hazard occurrence; and* *2. is not likely to suffer significant damage or loss in the event of a natural hazard occurrence; and* *3. is not likely to require new or upgraded hazard mitigation works to mitigate or avoid the natural hazard; and* *4. is not likely to exacerbate the effects of the natural hazard; or* *…..* *6. Within greater Christchurch, is proposed to be located in an area zoned in a district plan for urban residential, industrial or commercial use, or identified as a "Greenfield Priority Area" on Map A of Chapter 6, both at the date the Land Use Recovery Plan was notified in the Gazette, in which case the effects of the natural hazard must be avoided or appropriately mitigated; or* *7. Within greater Christchurch, relates to the maintenance and/or upgrading of existing critical or significant infrastructure.*

Policy 11.3.2	***Avoid development in areas subject to inundation*** *In areas not subject to Policy 11.3.1 that are subject to inundation by a 0.5% AEP flood event; any new subdivision, use and development (excluding critical infrastructure) shall be avoided unless there is no increased risk to life, and the subdivision, use or development:* *1. is of a type that is not likely to suffer material damage in an inundation event; or* *2. is ancillary or incidental to the main development; or* *3. meets all of the following criteria:* *a. new buildings have an appropriate floor level above the 0.5% AEP design flood level; and* *b. hazardous substances will not be inundated during a 0.5% AEP flood event;* *provided that a higher standard of management of inundation hazard events may be adopted where local catchment conditions warrant (as determined by a cost/benefit assessment).* *When determining areas subject to inundation, climate change projections including sea level rise are to be taken into account.*
Policy 11.3.3	***Earthquake hazards*** *New subdivision, use and development of land on or close to an active earthquake fault trace, or in areas susceptible to liquefaction and lateral spreading, shall be managed in order to avoid or mitigate the adverse effects of fault rupture, liquefaction and lateral spreading*
Policy 11.3.4	***Critical infrastructure*** *New critical infrastructure will be located outside high hazard areas unless there is no reasonable alternative. In relation to all areas, critical infrastructure must be designed to maintain, as far as practicable, its integrity and function during natural hazard events.*
Policy 11.3.5	***General risk management approach*** *For natural hazards and/or areas not addressed by policies 11.3.1, 11.3.2, and 11.3.3, subdivision, use or development of land shall be avoided if the risk from natural hazards is unacceptable. When determining whether risk is unacceptable, the following matters will be considered:* *1. the likelihood of the natural hazard event; and* *2. the potential consequence of the natural hazard event for: people and communities, property and infrastructure and the environment, and the emergency response organisations.* *Where there is uncertainty in the likelihood or consequences of a natural hazard event, the local authority shall adopt a precautionary approach.* *Formal risk management techniques should be used, such as the Risk Management Standard (AS/NZS ISO 31000:2009) or the Structural Design Action Standard (AS/NZS 1170.0:2002).*
Policy 11.3.6	***Role of natural features*** *The role of natural topographic (or geographic) and vegetation features which assist in avoiding or mitigating natural hazards should be recognised and the features maintained, protected and restored, where appropriate.*
Policy 11.3.7	***Physical mitigation works***

	New physical works to mitigate natural hazards will be acceptable only where: 1. *the natural hazard risk cannot reasonably be avoided; and* 2. *any adverse effects of those works on the natural and built environment and on the cultural values of Ngāi Tahu, are avoided, remedied or mitigated.* *Alternatives to physical works, such as the relocation, removal or abandonment of existing structures should be considered.* *Where physical mitigation works or structures are developed or maintained by local authorities, impediments to accessing those structures for maintenance purposes will be avoided.*
Policy 11.3.8	***Climate change*** *When considering natural hazards, and in determining if new subdivision, use or development is appropriate and sustainable in relation to the potential risks from natural hazard events, local authorities shall have particular regard to the effects of climate change.*

Appendix 3 Relevant provisions from the Regional Coastal Environment Plan.

Objective 9.1	*a. To minimise the need for hazard protection works, and avoid or mitigate the actual or potential effects of coastal hazards by locating use and development away from areas that are subject to coastal erosion and sea water inundation.* *b. To avoid, remedy or mitigate significant adverse effects on the environment as a result of measures used to manage coastal hazards.*
Policy 9.1	*a. New habitable buildings should be located away from areas of the coastal environment that are, or have the potential to be, subject to sea water inundation or coastal erosion.* *b. Any new development in the coastal environment should be designed or located in such a way that the need for coastal protection works, now and in the future, is minimised.* *c. The continued use and protection of essential infrastructure and services should be provided for, where no reasonable alternative exists, in areas subject to coastal hazards, provided adverse effects on the coastal environment are avoided, remedied or mitigated.* *d. New coastal protection works for existing use and development should only be considered where they represent the best practical option for natural hazard mitigation or avoidance, and adverse effects can be avoided, remedied or mitigated.* *e. Natural features that buffer the effects of coastal hazards should be protected.* *f. Any significant adverse effects from the location, type and design of coastal hazard damage minimisation measures should be avoided, remedied or mitigated.* *g. Environment Canterbury will provide information, including information on the incidence of natural occurrences, to encourage people to avoid locating in hazard prone areas.* *h. New coastal protection works should be assessed, and measures taken or advocated as appropriate, to remedy or mitigate any significant adverse effects or remove redundant structures, to assist in restoration and rehabilitation of the natural character of the areas concerned.*
Rule 9.1 (Permitted Activities)	*The following activities are Permitted Activities within Hazard Zone 1 or within Hazard Zone 2:* *a. The reconstruction or replacement of any structure, other than a structure damaged or destroyed by the action of the sea, provided that:* *i. the structure shall be reconstructed or replaced with one of the same or similar specifications; and* *ii. the structure shall not be reconstructed or replaced in a position that is further seaward than the original structure; and* *iii. if the structure is a habitable building, the floor area shall not be increased; and* *iv. where the habitable building is reconstructed or replaced in a different position on the site pursuant to this rule, the habitable building shall be erected in accordance with the requirements of the zone (within Christchurch City the zone shall be the Living 1 Zone) in the Proposed or Operative District Plan with respect to site coverage, recession planes and setbacks.* *b. The reconstruction or replacement of a habitable building damaged or destroyed by the action of the sea provided:* *i. the site (see definition) on which the habitable building is to be reconstructed or replaced has not eroded to less than 450m2; and*

	ii. the habitable building shall be reconstructed or replaced with one of the same or similar specifications; and *iii. the habitable building shall not be reconstructed or replaced in a position that is further seaward than the original habitable building; and* *iv. the floor area shall not be increased; and* *v. where the habitable building is reconstructed or replaced in a different position on the site pursuant to this rule, the habitable building shall be erected in accordance with the requirements of the zone (within Christchurch City the zone shall be the Living 1 Zone) in the Proposed or Operative District Plan with respect to site coverage, recession planes and setbacks.* *…* *d. The erection, reconstruction, placement, alteration, or extension of any fence;* *e. The repair or maintenance of any structure, (including a road or railway and its associated protection works), provided that:* *i. all disturbed land not physically covered by a structure shall be reinstated to conform to the natural or physical state pertaining in the area before the activity permitted by this rule commenced; and* *ii. the structure shall substantially retain the same form and dimensions; and* *iii. if the structure is a habitable building the floor area shall not increase;* *f. The disturbance of vegetation for the customary use of Runanga within their rohe;* *g. The excavation, filling, or disposal of spoil, or the removal of sand, rocks, shingle, shell, or other natural material and associated vegetation clearance, in order to undertake earthworks for the installation, maintenance, extension to, or removal of, network utility services, excluding the cutting of an access track across an active beach system, provided that all disturbed land not physically covered by any structure shall be reinstated to conform to the natural or physical state pertaining in the area before the activity permitted by this rule commenced.*
Rule 9.2 (Discretionary Activities for which Discretion is Restricted)	*Except where the activity is a Permitted Activity in accordance with Rule 9.1 of this Plan, or a Prohibited Activity in accordance with Rules 9.3 or 9.4 of this Plan, the following activities within Hazard Zone 1 or within Hazard Zone 2 are Discretionary Activities for which Environment Canterbury has restricted the exercise of its discretion:* *a. The erection, reconstruction, placement, alteration, or extension of any structure;* *b. The disturbance (burning, grazing, or removal) of vegetation within active beach systems;* *c. The formation of access tracks (including board walks) across an active beach system;* *d. The artificial adjustment of a beach profile, (including dune re-contouring), within an active beach system;* *e. The excavation, filling, or disposal of spoil in volumes greater than 5 cubic metres per 100 square metres of land area;* *f. The removal of sand, rocks, shingle, shell, or other natural material from an active beach system in volumes greater than 5 cubic metres by any person within any 12 month period.* ***Restriction of Discretion for Rule 9.2*** *Environment Canterbury restricts its discretion to the following matters when considering an application for a resource consent in accordance with Rule 9.2 of this plan and in imposing conditions in accordance with Section 108 of the Act:* *a. whether the activity is likely to exacerbate coastal erosion; and*

	b. whether the activity is likely to lead to adverse effects from natural hazards on any other property, (where property has the same meaning as in Section 2 of the Building Act 1991); *c. provision for the removal of any structure or parts of any structure that are rendered unusable through coastal erosion.*
Rule 9.3 (Prohibited Activities for which no resource consent shall be granted)	*The following activities are Prohibited Activities within Hazard Zone 1:* *a. the erection or placement of any habitable building with a floor area greater than 25 square metres, except as provided in rules 9.1(a) and 9.1(b) of this plan;* *b. the extension or alteration of any habitable building with a floor area of 25 square metres or less such that it causes the building to have a floor area greater than 25 square metres, except as provided in rules 9.1(a) and 9.1(b) of this plan;* *c. the construction of a landfill or the use of a landfill for the disposal of solid or hazardous waste;* *d. the production or storage of any hazardous substance, except where:* *i. The hazardous substance is being carried as cargo on a vehicle, rail wagon, vessel or aircraft; or* *ii. The storage is on a vehicle, rail locomotive, vessel or aircraft and is for the purpose of fuelling that vehicle, rail locomotive, vessel or aircraft; or* *iii. The storage is on a crane, or in or on a conveyor, or in a pipe or hose, that is being used to load or unload a vehicle, rail wagon, vessel, aircraft or storage container; or* *iv. The storage is such that the amount of the hazardous substance stored in any container, or stored in any building, or stored on or in any structure, is less than 1000 litres or less than one cubic metre in volume; or* *v. The production is such that the amount of the hazardous substance produced in any twelve-month period is less than 1000 litres or less than one cubic metre in volume.* *e. the construction of a new road or railway, but not including:* *i. the reconstruction or realignment of an existing road or railway within the hazard zone; or* *ii. the construction of a new road or railway that provides an access route to the Coastal Marine Area.*

Appendix 4 Relevant non-RMA management plans and strategies

Land Use Recovery Plan (LURP) **Appendix 1 – Amendments to the Canterbury Regional Policy Statement** **Appendix 3 – Amendments to the Waimakariri District Plan** Environment Canterbury, 2013	• Purpose is to provide for residential and business land use to support recovery and rebuilding in Canterbury to 2028. • Takes into account areas at high risk from natural hazards and seeks to avoid development in these areas where appropriate. • Appendix 1 details the required amendments to the CRPS, which involved the insertion of Chapter 6 (Recovery and rebuilding of Greater Christchurch). This includes identification of the unacceptable risk to people and property from natural hazards, and sea-level rise and the effects of climate change as key resource management issues. • Appendix 3 outlines the required amendments to the Waimakariri District Plan and planning maps, including the setting of minimum floor levels for specified areas in a 0.5% AEP event.
Long Term Plan 2018-2028	• Identifies that Council is progressively increasing the resilience of its infrastructure. • Council's engineering practices ensure all new and replaced assets are built to standards that take into account risk factors and the effects of climate change, and are designed for resilience. • Council has developed and adopted a Risk Assessment and Financing Strategy to assess the financial effects of major natural disasters.
Canterbury Civil Defence Emergency Management Group Plan 2014 (amended 2018)	• Adopts the vision of a resilient Canterbury. • Promotes a risk-based approach. • Identifies high priority hazards for the region, including earthquakes, tsunami (local or regional source), and flooding (including dam failure).
Flood Protection and Drainage Bylaw 2013 (amended 2019) – Environment Canterbury.	• Provides for the ongoing management and efficient operation of flood protection and flood control works that are owned or controlled by the Canterbury Regional Council.
Our District Our Future: Waimakariri 2048 District Development Strategy 2018	• This strategy guides the District's anticipated residential and business growth over the next 30 years. • It identifies that risk can be reduced and community resilience increased by avoiding High Hazard Areas, retaining natural defences, using sound engineering in design and construction, and being prepared for natural hazard events. Comments received during the Strategy's development urged the Council to identify areas of high risk from natural hazards, avoid development in areas with known constraints from flooding or sea level rise, and have planning in place that enables an effective response to hazards.

Appendix 5 Comparison of Adjoining Territorial Authorities Approach to Natural Hazards

Plan	Objectives	Policies	Permitted	Controlled	Restricted Discretionary	Discretionary	Non Complying	Prohibited
Hurunui District Plan 2018 Hazards addressed: • Flooding • Active Faults • Liquefaction • Wildfire • Slope instability	**Approach** Policy framework is risk based, but a weak approach taken to the rules, which appears to be due to a lack of information on the hazards present. Strong reference in the natural hazards chapter to Policy 11.3.1. of the RPS. Use of a Fault Avoidance Zone where detailed mapping has been undertaken, and a Fault Awareness Zone where detailed analysis of known faults has not yet occurred. Coastal Hazard Line provided on maps, based on information from Environment Canterbury, but no corresponding rules. No NH rules for infrastructure, land transport, or earthworks.							
	NATURAL HAZARDS **Objective 15.1** Subdivision, use and development of land is enabled while avoiding or mitigating the adverse effects of natural hazards.	**NATURAL HAZARDS** **Policy 15.1** To avoid new subdivision, use and development of land in areas identified as subject to natural hazards: 1. If the risk from the natural hazard is unacceptable, having taken into account the likelihood of the natural hazard event and the potential consequences for people, property, infrastructure and the environment, including the level of uncertainty about the likelihood or consequences; and 2. For high hazard areas, if the matters in Policy 11.3.1 of the Canterbury Regional Policy Statement 2013 are not met. **Policy 15.2** To avoid development, excluding critical infrastructure, within areas at risk from flooding or ponding during a 0.5% AEP (Annual Exceedance Probability) storm event, unless: 1. an assessment is undertaken by suitably qualified person which shows that the land is not subject to flooding or ponding during a 0.5% AEP storm event; or 2. appropriate mitigation measures are undertaken to mitigate the risk of flooding on life or property; and 3. the site is outside of a high hazard area; and 4. the development will not increase the risk to life and is of a type that is not likely to suffer material damage in an inundation event. **Policy 15.3** To avoid the subdivision, use or development of land within the Fault Avoidance Zone unless the adverse effects of fault rupture can be mitigated so as to ensure that there is no greater risk to health and safety during and after an earthquake. **Policy 15.4** To avoid the development of land within any Fault Awareness Zones for post emergency infrastructure	**NATURAL HAZARDS** **Rule 15.4.2 and 15.4.3** Activities within a Natural Hazard Area or a Natural Hazard Assessment and Awareness Area that are low risk e.g. fencing, farm accessory buildings, non-habitable residential accessory buildings. Dwellings, extensions to dwellings, habitable accessory buildings and principal buildings located in the Fault Avoidance Zone (excluding Morford Estate) provided the location, design and construction complies with the recommendations of a suitably qualified person. Buildings in the Fault Awareness Zone shall not be a Building of Importance. Extensions to dwellings, habitable accessory buildings and principal buildings that increase the floor area by more than 10% in the flood assessment zone require a floor level at least 400 mm above the		**NATURAL HAZARDS** **Rule 15.4.4** The construction of, or extension to, any building within the Mt Lyford Slope Assessment Area. A geotechnical assessment prepared by a suitably qualified person shall be submitted with the application. Elevates to NC	**NATURAL HAZARDS** **Rule 15.4.5** Any activity that does not meet permitted standards and is not identified as a RDIS or NC activity. **SUBDIVISION** **Rule 5.4.5** Subdivision of land within a Natural Hazard Area or Natural Hazard Assessment and Awareness Area that complies with the standards for controlled activities.	**NATURAL HAZARDS** **Rule 15.4.6** A Building of Importance located within a Fault Avoidance Zone. Dwellings, extensions to dwellings, habitable accessory buildings or principal buildings located within the Fault Avoidance Zone as identified on the Morford Estate Outline Development Plan. Subdivision of land within a Natural Hazard Area.	

Plan	Objectives	Policies	Permitted	Controlled	Restricted Discretionary	Discretionary	Non Complying	Prohibited
		or infrastructure which large numbers of people congregate in, unless that infrastructure has been appropriately designed and sited in relation to the fault hazard. **Policy 15.5** To avoid the subdivision of land in a Liquefaction Awareness Zone unless a geotechnical investigation is undertaken, the risk of liquefaction is determined, and if necessary appropriate mitigation, including foundation design and land stability engineering is undertaken. **Policy 15.6** Mitigation works to minimise the effects of natural hazards shall be undertaken in a way which avoids, remedies or mitigates adverse effects on cultural, social and environmental values and the health and safety of communities. **Policy 15.7** To avoid the subdivision, use or development of land within the seaward side of the Coastal Hazard Line unless the proposed development is the repair or upgrade of existing infrastructure; and mitigation is undertaken to ensure that there is no increased risk to life or built infrastructure or a consent has been sought and granted for the proposed development under the Regional Coastal Plan. **Policy 15.8** To recognise that climate change could alter the frequency and duration of some natural hazard events. Any mitigation works should take into consideration the need to be precautionary given the uncertainties as to the magnitude of effects from climate change. New subdivision, use and development should consider the consequences of a mean sea-level rise of at least 0.8m relative to the 1980-1999 average. **Policy 15.9** To assess the risks of natural hazards prior to land being rezoned and to avoid or mitigate those risks. **Policy 15.10** To ensure that new subdivision within the Mt Lyford area appropriately addresses the risk of uncontrolled wildfire to provide for residents' and visitors' health and safety. **Policy 15.11** To recognise that the risk of flooding can be reduced by mineral extraction activities in river beds that increase their flood carrying capacity.	0.5% AEP flood event level. Buildings cannot be located within the Mt Lyford Slope Assessment Area. Note: there are specific standards for particular areas.					

Plan	Objectives	Policies	Permitted	Controlled	Restricted Discretionary	Discretionary	Non Complying	Prohibited
		Policy 15.12 To manage the subdivision, use and development of land within the Mt Lyford Slope Assessment Area by: 1. Requiring a geotechnical assessment to be undertaken to determine the risk of slope instability on the site and to identify if mitigation, including foundation design and land stability engineering, is required to mitigate the risk; and 2. Requiring recommendations from the geotechnical assessment to be implemented in full; and 3. Avoiding subdivision, use and development of land where any residual natural hazard risk is unable to be sufficiently mitigated. **SETTLEMENTS** **Policy 4.5** To recognise that some settlements have been developed in locations subject to natural hazards, especially flooding and coastal erosion, which may be exacerbated by climate change, and to discourage further development or investment of public resources in these areas, particularly seaward of coastal hazard lines. **Policy 4.42 – Mt Lyford** To manage activities in a way that is proportionate to the likelihood and consequence of the natural hazard risk.						
Selwyn District Plan 2016 Hazards addressed: • Flooding • Coastal • Active faults Note: active faults are identified in the planning maps but the only reference is Rule E25.12.2 in relation to BIC 3 and 4 buildings in the Porters Ski Village Base Area.	**Approach** Does not take a risk based approach. Does not give effect to higher order documents or national level guidance. The focus is very much on flood hazards alone. Objectives, policies and methods for natural hazards are contained in the Natural Hazards Chapter, while rules are located in the relevant chapter. Rules are more restrictive in Living Zones compared to the Rural Zone. Minimum floor levels above flood levels are required, but with differing requirements for different areas (2% AEP, 0.5% AEP, above mean sea level, and differing freeboard). It is noted that compliance with Policy B3.1.4 in relation to the requirement for minimum floor levels above the level of a 2% AEP flood event will not prevent a s74 notice being lodged on the title. In Chapter B4 Growth of Townships there are various objectives and policies requiring that new development is not located in areas subject to flooding, and does not cause or exacerbate a natural hazard. The District Plan notes that where info is lacking (e.g., Whitecliffs and Hororata), reliance is on the Building Act, s106 RMA and LIMs.						
	NATURAL HAZARDS **Objective B3.1.1** Ensure activities do not lead to or intensify the effects of natural hazards.	**NATURAL HAZARDS** **Policy B3.1.1** Promote awareness among residents in Selwyn District of the potential for a District-wide natural hazard, and how to respond to minimise loss of life and damage to property.	**BUILDINGS** **Rural Zone** **Rule 3.1.1** Erecting any buildings or any additions or alterations to, or modification or		**BUILDINGS** **Living Zone** **Rule 4.1.1** Erecting any dwelling or other principal building on land located in the Living 1A or 2A zones at		**BUILDING** **Living Zone** **Rule 4.1.3** Erecting any new dwelling, or part dwelling thereof, or other principal building,	**BUILDINGS** **Living Zone** **Rule 4.1.4** Erecting any dwelling or other principal building between any waterbody and any stop bank

Plan	Objectives	Policies	Permitted	Controlled	Restricted Discretionary	Discretionary	Non Complying	Prohibited
	Objective B3.1.2 Ensure potential loss of life or damage to property from natural hazards is mitigated. **Objective B3.1.3** Ensure methods to mitigate natural hazards do not create or exacerbate adverse effects on other people or the environment.	**Policy B3.1.2** Avoid allowing new residential or business development in areas known to be vulnerable to a natural hazard, unless any potential risk of loss of life or damage to property is adequately mitigated. **Policy B3.1.3** Avoid locating dwellings and other principal buildings in the following areas: • Between any waterbodies and any stopbank designed or used to contain floodwater from that waterbody; or • Within the bed of any lake or river. **Policy B3.1.4** Ensure any new dwelling or principal building located in the Living 1A or Living 2A zone at Tai Tapu is designed or sited to avoid flooding in a 2% Annual Event Probability (AEP) flood event. **Policy B3.1.5** Ensure any earthworks undertaken in the Living 1A or Living 2A Zones at Tai Tapu do not divert or displace floodwater on to other people's property with adverse effects that are more than minor. **Policy B3.1.6** Ensure any measures proposed to mitigate a potential natural hazard: • Do not lead to or intensify a potential natural hazard elsewhere; and • That any other adverse effects on the environment are avoided, remedied or mitigated. **Policy B3.1.7** Ensure any new residential or business development does not adversely affect the efficiency of the District's land drainage system or the risk of flooding from waterbodies. **Policy B3.1.8** Continue to develop the information base on the location and characteristics of natural hazards in Selwyn District. **UTILITIES** **Policy B2.2.8** Ensure utilities located in areas subject to flooding or slips, do not exacerbate natural hazards.	demolition of, any building shall be a permitted activity if all of the following conditions are met: *3.1.1.1* Any new dwelling or other principal building is not erected in the following areas: (a) Any area shown on the Planning Maps as the Waimakariri Flood Category A area; (b) Seaward of the Coastal Hazard 1 Line as shown on the Planning Maps; (c) Between any waterbody and any stopbank designed to contain floodwater from that waterbody; and (d) The area shown on the Planning Maps as the Lower Plains flood area; unless a minimum building floor level 300mm above a 2% Annual Exceedance Probability (AEP) hazard event is identified and the building floor level is at or above that level; (e) The area shown on the Planning Maps as the Lake Ellesmere/Te Waihora Flood area, unless a minimum building floor level of 3m above mean sea level (Lyttelton Datum 1937) is identified. **EARTHWORKS** **Living Zone**		Tai Tapu where the minimum floor level is less than 6.93m above mean sea level. Any dwelling on land located in the Living 3 zone at Tai Tapu shall have a minimum freeboard height of 400mm above the 0.5% Annual Exceedance Probability flood event; and shall be sited on a building platform to be established prior to the issue of the building consent for the dwelling… **Rural Zone** **Rule 3.1.2** Any new dwelling or principal building in the areas listed in Rule 3.1.1.1(d) and (e) that does not comply with the required minimum floor level. **SUBDIVISION** **Rural Zone** **Rules 10.1.1.1 and 10.2.1** Any subdivision of land within any of the following areas: (a) The Waimakariri Flood Category A area; (b) The Lower Plains or Lake Ellesmere/Te Waihora flood areas; (c) Seaward of the Coastal Hazard Line; (d) Between any waterbody and any stopbank designed to contain floodwater from that waterbody. Provided that the following standards and terms are met:		on Lots 58 to 108…at Rakaia Huts. **Rural Zone** **Rule 3.1.4** Erecting any new dwelling or other principal building on any site in the areas listed in Rules 3.1.1.1(a), (b) or (c). **SUBDIVISION** **Rural Zone** **Rule 10.2.4** Any subdivision of land which does not comply with Rule 10.2.1.	designed to contain flood water from that waterbody.

Plan	Objectives	Policies	Permitted	Controlled	Restricted Discretionary	Discretionary	Non Complying	Prohibited
			Rule 2.1.1.5 On land located within the Living 1A or2A Zones at Tai Tapu, earthworks are limited to the forming of any accessway to a site or the preparation of any site to erect a building, provided that these earthworks do not alter or impede the land drainage pattern. **Rural Zone** **Flood Areas** **Rule 1.4.1** *1.4.1.1* The forming of vehicular accessways through or within properties and the forming of building platforms, provided that the existing land drainage patterns are not altered or impeded; or *1.4.1.2* Any other earthworks which do not raise the mean average level of the land subject to the earthworks or reduce the storage capacity of surface water ponding areas. **ROADS** **Rural Zone** **Rule 4.2.1** The forming, installation, upgrading, maintenance or replacement of any road shall be a permitted activity if the following conditions are met: *4.2.1.1* In any areas shown on the Planning Maps as a flood area, the road is not located in a position or designed in such a way that it would:		*10.1.1.1* Any land subdivided within the Waimakariri Flood Category A area or seaward of the Coastal Hazard 1 Line is not used to erect any dwelling or other principal building; and *10.2.1.2* Any land subdivided between any waterbody and any stopbank designed to contain floodwater from that waterbody is not used to erect any dwelling or building. **EARTHWORKS** **Living Zone** **Rule 2.1.4** Any activity which does not comply with Rule 2.1.1.5. **Rural Zone** **Flood Areas** **Rule 1.4.2** Any earthworks undertaken within any area shown on the Planning Maps as a flood area which do not comply with Rule 1.4.1 **ROADS** **Rural Zone** **Rule 4.2.2** Any activity that does not comply with Rule 4.2.1. **PORTERS SKI AREA** **Buildings** **Rule E25.12** ***E25.12.2*** Any building of Building Importance Category 3 or 4 located within the Village Base Area. Council shall restrict its discretion to: (a) The risk of, and ability of buildings to withstand, fault rupture.			

Plan	Objectives	Policies	Permitted	Controlled	Restricted Discretionary	Discretionary	Non Complying	Prohibited
			(a) Divert, or displace, any floodwater; or (b) Impede or alter the existing drainage pattern of the land.					
Selwyn Proposed District Plan - notified 5 October 2020 Hazards addressed: • Coastal erosion • Coastal inundation • Flooding • Liquefaction • Slope instability • Active faults • Wildfire	**Approach** Proposes a significantly more comprehensive approach to natural hazards and risk compared to the operative plan. Takes a risk based approach to the management of natural hazards, that enables the focus of the provisions to be on those developed areas where there is greatest risk. In general, the plan provides for the continuation of existing activities in high hazard areas where risk will not be increased, but seeks to avoid new development through the use of NC and PR activity statuses. Specific notes: Flooding - Flood hazards are now to be consistently managed, with minimum floor levels of 300mm above the 200 year ARI (0.5% AEP) flood level required Tsunami - Policy NH-P9 requires the consideration of the provision for the evacuation of vulnerable persons in the Tsunami Policy Overlay. Active Faults - Uncertainty managed by use of a Fault Investigation Overlay and a Fault Awareness Overlay. Coastal Erosion Overlay - There are currently no dwellings in the Coastal Erosion Overlay, which borders the Rakaia Huts. Slope instability - Requires proposed mitigation works to be accompanied by an evaluation that includes calculations of AIFR. Infrastructure - NC in high hazard zones and in the Greendale Fault Avoidance Overlay.							
	STRATEGIC DIRECTIONS – INFRASTRUCTURE, RISK AND RESILIENCE **Objective SD-IR-O3** The risk from natural hazards, including the effects of climate change, to people, property and important infrastructure is not increased, other than where necessary to provide for important infrastructure that has no reasonable alternative. **NATURAL HAZARDS** **Objective NH-O1** New subdivision, use, and development, other than new important infrastructure and land transport infrastructure: 1. Is avoided in areas where the risks from natural hazards to people,	**NATURAL HAZARDS GENERAL** **Policy NH-P1** Avoid new subdivision, use, or development of land in high hazard areas (except for important infrastructure and land transport infrastructure), unless the subdivision, use or development: 1. is not likely to result in loss of life or serious injuries; and 2. is not likely to suffer significant damage or loss; and 3. is not likely to require new or upgraded hazard mitigation works to mitigate or avoid the natural hazard; and 4. either is: a. not likely to exacerbate the effects of the natural hazard; or b. proposed to be located in a Residential Zone, Commercial Zone or Industrial Zone, in which case the effects of the natural hazard must be avoided or appropriately mitigated. **Policy NH-P2** Avoid the development or use of land, buildings or structures in high hazard areas for any important infrastructure or land transport infrastructure, unless the activity: 1. does not pose a significant risk, or exacerbate an existing risk, to people or property; and 2. either:	**NATURAL HAZARDS EXISTING BUILDINGS Coastal Erosion Overlay and Coastal Inundation Overlay** **Rule NH-R1.1/NH-R1.8** The repair, maintenance, alteration, reconstruction or replacement of any existing building or structure where: a. it is not a residential unit or other principle building damaged by the direct action of the sea. **Rule NH-R1.4/NH-R1.11** If (a) is not met, then repair, alteration etc. is permitted if the site has not eroded to less than 800m^2. Requirements include: • no increase in building footprint (elevates to NC)	**SUBDIVISION** Most CON subdivisions are subject to matters of discretion NH-MAT3 Geotechnical Considerations, which include: • The outcome of a geotech investigation undertaken by a qualified engineer where the site is wholly or partly: o Outside the Liquefaction Damage Unlikely Overlay o Within the Liquefaction Damage Unlikely Overlay but subdivision or land use will result in 15 or more sites of dwellings o Within the Greendale Fault Avoidance Overlay o Subdivision or new important	**NATURAL HAZARDS EXISTING BUILDINGS Coastal Erosion Overlay** **Rule NH-R1.5** Where compliance with Rules NH-R1.4/NH-R1.11 is not achieved. **NATURAL HAZARD MITIGATION WORKS** **Rule NH-R6.4** Any land instability hazard mitigation works. Matters of Discretion: Evaluation by Chartered Professional Engineer with experience in geotechnical engineering and using best practice methods as to whether the proposal will • Increase the stability of land; and • Protect buildings and structures and their occupants. • Achieve an acceptable risk to	**NATURAL HAZARDS New Buildings - Coastal Erosion Overlay and Coastal Inundation Overlay** **Rule NH-R2.1** Any new residential unit or other principal building where it is located in a Residential Zone. **NATURAL HAZARD MITIGATION WORKS** **Rule NH-R4.2, 4.3/NH-R5.2, 5.3** The replacement or upgrading of any existing, or any new, hard protection coastal hazard mitigation work or defence against water. **SUBDIVISION** **Coastal Erosion Overlay and Coastal Inundation Overlay** **Rule SUB-R17** Subdivision in the Settlement Zone, excluding updates to	**NATURAL HAZARDS NEW BUILDINGS Coastal Erosion Overlay and Coastal Inundation Overlay** **Rule NH-2.2** Where compliance with Rule NH-R2.1 is not achieved **Waimakariri Flood Management Overlay** The establishment of any new residential unit or other principal building. **SUBDIVISION** **Coastal Erosion Overlay and Coastal Inundation Overlay** **Rule SUB-R17.2** Subdivision in the General Rural Zone, and of General Land in the Māori Purpose Zone excluding updates to cross leases, company leases and unit titles. **Waimakariri Flood Management Overlay.**	**NATURAL HAZARDS EXISTING BUILDINGS Coastal Erosion Overlay** Any residential unit or principal building that has a maximum gross floor area greater than 25m^2. **TRANSPORT** Within the coastal erosion overlay, any new land transport infrastructure that: • Is not within an existing land transport corridor, or • Does not provide an access route to the coastal marine area.

Plan	Objectives	Policies	Permitted	Controlled	Restricted Discretionary	Discretionary	Non Complying	Prohibited
	property and infrastructure are assessed as being unacceptable; and 2. In all other areas, is undertaken in a manner that ensures that the risks of natural hazards to people, property and infrastructure are appropriately mitigated. **Objective NH-O2** Important infrastructure and land transport infrastructure is only located within areas of significant natural hazard risk where there is no reasonable alternative and the important infrastructure or land transport infrastructure is designed so as not to exacerbate natural hazard risk to people and property. **Objective NH-O3** Methods to mitigate natural hazards do not create or exacerbate adverse effects on other people, property, infrastructure, or the environment. **Objective NH-O4** The effects of climate change, and its influence on sea levels and the frequency and severity of natural hazards, are recognized and provided for.	a. has a functional need or operational need to be in that location; or b. is not vulnerable to the natural hazard; and 3. contributes to the resilience of the community in the event of a natural disaster. **Policy NH-P3** Restrict new subdivision, use or development of land in areas outside high hazard areas but known to be vulnerable to a natural hazard, unless any potential risk of loss of life or damage to property is adequately mitigated. **Policy NH-P4** Natural hazard mitigation works shall consider: 1. approaches to risk management that reduce the need for physical works and similar engineering interventions; 2. the nature of the natural hazard risk and how it might change over at least a 100-year timeframe, including the expected effects of climate change; 3. the potential for adverse effects on indigenous biodiversity, Ngāi Tahu cultural values, or sites of historic heritage or geological value; 4. identification of and a plan for transition mechanisms and timeframes for moving to more sustainable approaches; and 5. the physical works necessary to ensure that the form and location of any structure is designed to minimise adverse effects on the environment. **Policy NH-P5** When determining if new subdivision, use, or development is appropriate and sustainable in relation to the potential risks from natural hazard events, have particular regard to the effects of climate change. **COASTAL HAZARDS** **Policies NH-P6 to NH-P9** • Avoid hard protection structures and enable the use of alternatives. • Recognise that hard protection structures may be the only practical means to protect existing important infrastructure and land transport infrastructure. • Where hard protection structures are considered necessary to protect private assets, avoid their location on public land unless there is significant public or environmental benefit in doing so.	• no increase in habitable rooms (elevates to NC) • cannot be located further seaward (elevates to NC) • max gross floor area of 25m2 (coastal erosion overlay only – elevates to PR) **Plains Flood Management Overlay** The alteration, addition to, reconstruction or replacement of any existing residential unit or other principal building. Where: a. The building is not located in the high hazard area; and b. The finished floor height of any addition of <25m² can match the existing floor level or is 300mm above the 200 ARI event. Elevates to RDIS **Rule NH-R2.3** New residential unit or principal building. Where: • Not in high hazard area (elevates to NC) • Not located between a waterbody and an associated stopbank (elevates to NC) • Min floor level 300mm above 200yr ARI. (elevates to RDIS) **Waimakariri Flood Management Overlay** The alteration, reconstruction or	infrastructure within the Fault Investigation Overlay o Important infrastructure within the Fault Awareness Overlay. Plans and information must identify all relevant geotechnical hazards, identify areas of that require mitigation and recommendations, identify areas that should be excluded from development.	life or property, applying an AIFR of 10^{-4}. • Whether a lower AIFR is appropriate given the sensitivity of the proposed activity • Whether the works will be supervised by a Professional Engineer. **SUBDIVISION** Most RDIS subdivisions are subject to matters of discretion NH-MAT3 Geotechnical Considerations. Refer to CON column for details. **Rule SUB-R17.4** Subdivision in the Plains Flood Management Overlay, excluding updates to cross leases, company leases and unit titles. Where: • Every site created is outside a high hazard area; and • Minimum floor level 300mm above the 200 year ARI event.	cross leases, company leases and unit titles.	**Rule SUB-R17.7** Subdivision within the Waimakariri Flood Management Overlay, excluding updates to cross leases, company leases and unit titles	

Plan	Objectives	Policies	Permitted	Controlled	Restricted Discretionary	Discretionary	Non Complying	Prohibited
		• Ensure that where use or development within the Tsunami Policy Overlay results in the congregation of vulnerable persons, adequate provision for their evacuation in the event of a tsunami has been made. **Flood Hazards** **Policy NH-P10** • Provide for new subdivision, use and development (other than important infrastructure and land transport infrastructure) in flood areas that are <u>not</u> high hazard areas where every new residential unit or principal building has an appropriate floor level above the 200 year Average Return Interval (ARI) design flood level. **Policy NH-P11** Avoid locating any residential unit or other asset of high value between any waterbody and any defence against water designed or used to contain floodwater from that waterbody, unless that asset has a functional need or operational need to be in that location. **Policy NH-P12** Manage earthworks undertaken in the Waimakariri Flood Management Overlay and the Plains Flood Management Overlay to ensure that they do not exacerbate flooding on any other property by displacing or diverting floodwater on surrounding land. **Geotechnical Hazards** **Policies NH-P13 to NH-P19** • Provide for subdivision where liquefaction risk has been assessed and can be adequately remedied or mitigated. • Provide for subdivision, use and development where slope instability risk has been assessed and can be adequately remedied or mitigated. • In the Greendale Fault Avoidance Overlay, avoid the development, or use of land, buildings or structures for any community facility, infrastructure or major hazard facility, unless the risk is not significant it has a functional or operational need to be in that location • Within the Fault Investigation Overlay restrict development or use of land or buildings for any community facility, infrastructure or major hazard facility unless the adverse effects to human health and safety can be mitigated. • Within the Fault Awareness Overlay, restrict the development of any infrastructure or major	replacement of any existing residential unit or other principal buildings. Where: a. The finished floor height is not lower than the floor level of the existing building. Elevates to RDIS Requirements include: • Additions don't increase building footprint or habitable rooms. Elevates to NC **NATURAL HAZARDS EARTHWORKS** **Rule NH-R3** In the Coastal Inundation Overlay, Plains Flood Management Overlay and the Waimakariri Flood Management Overlay. Where: a. The activity does not alter the flow of flood water from or onto any other property. Elevates to RDIS Note: N/A in Coastal Erosion Overlay where underlying zone rules apply. **NATURAL HAZARD MITIGATION WORKS** **Rule NH-R4.1/NH-R5.1** The maintenance or operation of any existing coastal hazard mitigation work, or existing defence against water. Underlying earthworks provisions do not apply. **Rule NH-R6.1**					

Plan	Objectives	Policies	Permitted	Controlled	Restricted Discretionary	Discretionary	Non Complying	Prohibited
		hazard facility unless the adverse effects to human health and safety can be mitigated. • Restrict subdivision and rezoning in the fault overlays unless the hazards has been appropriately identified and assessed and the risk can be remedied or mitigated. **Wildfire Hazard** **Policy NH-P20** Restrict the planting of any woodlot or shelterbelt if it is located in a position that increases the wildfire risk on any neighbouring residential unit or other principal building. **Policy NH-P21** Consider the wildfire risk on any residential unit or other principal building when requiring plantings for visual screening. URBAN GROWTH Policy UG-P8 Avoid the following locations and areas when zoning land to extend township boundaries to establish new urban environments: • High hazard areas.	The establishment of a new, or expansion of an existing retaining wall. Where the wall is: • Max of 6m² in area • Max 1.8m high • Is not for the purpose of hazard mitigation works Elevates to RDIS **ENERGY AND INFRASTRUCTURE** **Rules EI-R9, R10, R14, R15, R17, R19, R22, R24, R26, R27, R28, R30, R32, R33** The establishment of new or expansion of a range of network utilities and infrastructure, including emergency services facilities and public healthcare institutions, provided the requirements are met, including NH-REQ5.1: • The activity is located outside of any high hazard area and the Greendale Fault Avoidance Overlay. Elevates to NC **TRANSPORT** Includes many permitted activities within the land transport corridor which are subject to the requirements of NH-REQ6, being: Within the coastal erosion overlay, any new land transport infrastructure must: • Be within an existing land transport corridor, or					

<table>
<tr><th>Plan</th><th>Objectives</th><th>Policies</th><th>Permitted</th><th>Controlled</th><th>Restricted Discretionary</th><th>Discretionary</th><th>Non Complying</th><th>Prohibited</th></tr>
<tr><td></td><td></td><td></td><td>• Provide an access route to the coastal marine area.
Elevates to PR</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">Christchurch City District Plan

Hazards addressed:
• Flooding
• Liquefaction
• Slope instability

Coastal hazards are still managed under the Christchurch City Plan and the Banks Peninsula District Plan, as they were withdrawn from the Christchurch Replacement District Plan in 2015.</td><td colspan="8">Approach
Comprehensive risk based approach.
There are a number of provisions that relate to each of the natural hazards managed under the plan, and so not all are presented here. In general, the plan seeks to avoid new development in high hazard areas, while allowing in areas of lower risk provided the adverse effects can be mitigated to an acceptable level.
Flood hazards categorised as:
• Flood Management Areas
• Te Waihora/Lake Ellesmere and Waiwera/Lake Forsyth Flood Management Areas
• Waimakariri Flood Management Area
• Flood Ponding Management Area
• High Flood Hazard Management Area
Slope instability hazards categorized as:
• Cliff Collapse Management Area 1
• Cliff Collapse Management Area 2
• Rockfall Management Area 1
• Rockfall Management Area 2
• Mass Movement Area 1
• Mass Movement Areas 2 & 3
• Remainder of Port Hills and Banks Peninsula Slope Instability Management Area.
Rules include the ability to conduct a site specific AIFR calculation in the Rockfall Management Area 1, 2 and/or Cliff Collapse Management Area 2 to reduce the activity status via a AIFR certificate issued by the Council.</td></tr>
<tr><td>STRATEGIC DIRECTIONS
Objective 3.3.6 - Natural hazards
(a) New subdivision, use and development (other than new critical infrastructure or strategic infrastructure to which paragraph b. applies):
i. is to be avoided in areas where the risks from natural hazards to people, property and infrastructure are assessed as being unacceptable; and</td><td>NATURAL HAZARDS
5.2.2.1 General natural hazards policies
5.2.2.1.1 Policy - Avoid new development where there is unacceptable risk
Avoid new subdivision, use and development, including new urban zonings, where the risk from a natural hazard is assessed as being unacceptable.

5.2.2.1.2 Policy - Manage activities to address natural hazard risks
Manage activities in all areas subject to natural hazards in a manner that is commensurate with the likelihood and consequences of a natural hazard event on life and property.

5.2.2.1.3 Policy - Infrastructure
Avoid locating new critical infrastructure where it is at risk of being significantly affected by a natural hazard unless, considering functional and operational requirements, there is no reasonable alternative location or method.

Enable critical infrastructure to be designed, maintained and managed to function to the extent practicable during and after natural hazard events.</td><td>NATURAL HAZARDS FLOOD PONDING MANAGEMENT AREA
The replacement or repair of buildings.

Some filling and excavation

Utilities (less than 10m2)

Residential units (on piles or has a max GFA of 200m2). Only 1 per site.

Accessory buildings with floors or farm buildings with floors (on piles or has a max GFA of 200m2). Only 1 accessory or farm building per site up to 20ha + 1 per additional 20ha of the site.</td><td>LIQUEFACTION MANAGEMENT AREA
Any subdivision which creates an additional vacant allotment or allotments in the Liquefaction Management Area.</td><td>NATURAL HAZARDS FLOOD PONDING MANAGEMENT AREA
Site specific filling, excavations, subdivision.

Utilities that do not meet standards.

FLOOD MANAGEMENT AREA
Where permitted standards can’t be met.

WAIMAKARIRI FLOOD MANAGEMENT AREA
New buildings or additions to buildings which are not permitted by the activity status rules.

Filling or excavation which is not a permitted activity.</td><td></td><td>NATURAL HAZARDS FLOOD PONDING MANAGEMENT AREA
Subdivision (creating an additional vacant allotment).

New buildings.

The replacement or repair of buildings.

Filling or excavation.

WAIMAKARIRI FLOOD MANAGEMENT AREA
New buildings or accessory buildings or additions in proximity to stopbanks.

Filling or excavation in proximity to stopbanks.

HIGH FLOOD HAZARD MANAGEMENT AREA
Unless specified:</td><td>SLOPE INSTABILITY
Subdivision, earthworks, and hazard mitigation works Cliff Collapse Management Area 1</td></tr>
</table>

Plan	Objectives	Policies	Permitted	Controlled	Restricted Discretionary	Discretionary	Non Complying	Prohibited
	ii. in all other areas, is undertaken in a manner that ensures the risks of natural hazards to people, property and infrastructure are appropriately mitigated. (b) New critical infrastructure or strategic infrastructure may be located in areas where the risks of natural hazards to people, property and infrastructure are otherwise assessed as being unacceptable, but only where: i. there is no reasonable alternative; and ii. the strategic infrastructure or critical infrastructure has been designed to maintain, as far as practicable, its integrity and form during natural hazard events; and iii. the natural hazard risks to people, property and infrastructure are appropriately mitigated.	Recognise the benefits of infrastructure and the need for its repair, maintenance and ongoing use in areas affected by natural hazards. **5.2.2.1.4 Policy - No transferring of natural hazard risk** Ensure that subdivision, use and development (including proposals for hazard mitigation works or hazard removal) do not transfer or create unacceptable natural hazard risk to other people, property, infrastructure or the natural environment. **5.2.2.1.5 Policy - Natural features providing hazard resilience** Protect natural features which assist in avoiding or reducing the risk of natural hazards, such as natural ponding areas, coastal dunes, wetlands, water body margins and riparian vegetation from inappropriate subdivision, use and development and where appropriate restore, maintain or enhance the functioning of these features. **5.2.2.1.6 Policy - Awareness of natural hazards** Ensure people are informed about the natural hazards relating to their properties and surrounding area, including through provision of relevant information on Land Information Memoranda and hazard mapping on the Council's website. Encourage property owners to incorporate measures into buildings including earthquake damaged buildings beyond existing use rights or minimum building standards to avoid or mitigate natural hazards affecting their property. **5.2.2.1.7 Policy - Repair of earthquake damaged land** Facilitate recovery by enabling property owners to make repairs to earthquake damaged land for residential purposes, where these repairs will appropriately manage adverse effects on people, property or the natural environment. Recognise that the repair of other earthquake damaged land is necessary as part of recovery. **5.2.2.1.8 Policy - Assessment of hazards** Ensure that the level of assessment undertaken for plan changes, subdivision or development reflects the potential scale and significance of the hazard; and the nature and scale of the rezoning, subdivision or development and its susceptibility to those hazards. **5.2.2.2 Policy for managing risk from flooding**	Above ground swimming pools **FLOOD MANAGEMENT AREA** New buildings and extensions within the Fixed Minimum Floor Level Overlay, within the Flood Management Area (subject to standards for minimum floor levels). New buildings or additions to existing buildings within the Flood Management Area, but outside of the Fixed Minimum Floor Level Overlay shall have a floor level that is greater than or equal to that specified in a Minimum Floor Level Certificate. Filling or excavation (subject to standards for height/depth/area) Garages to 40m2 Accessory buildings without floors Outdoor storage Decks, swimming pools, and unenclosed **buildings** without floors. Utilities and LPG Storage Tanks. NB: Floor levels based on flooding predicted to occur in a 0.5% AEP (1 in 200-year) rainfall event concurrent with a 5% AEP (1 in 20-year) tidal event, including 1 metre sea level rise plus 400mm freeboard.		**HIGH FLOOD HAZARD MANAGEMENT AREA** Subdivision within an area specified. Residential units within the Residential Unit Overlay. **LIQUEFACTION MANAGEMENT AREA** Any activity located on a site with an area of 1500m^2 or more, qualifying as a controlled or restricted discretionary activity under any of the following residential rules specified.		Any subdivision which creates an additional vacant allotment or allotments. New buildings The replacement or repair of buildings that do not meet one or more of the activity specific standards in Rule 5.4.6.1 Change in use of a site that increases the occupancy of the site. **SLOPE INSTABILITY** Subdivision and earthworks in Cliff Collapse Management Area 2, Rockfall Management Area 1 and Mass Movement Management Area 1	

Plan	Objectives	Policies	Permitted	Controlled	Restricted Discretionary	Discretionary	Non Complying	Prohibited
	(c) There is increased public awareness of the range and scale of natural hazard events that can affect Christchurch District. (d) The repair of earthquake damaged land is facilitated as part of the recovery.	**5.2.2.2.1 Policy - Flooding** Map hazard risk for the Flood Management Area based on: i. a modelled 0.5% AEP (1 in 200-year) rainfall event plus a 5% AEP (1 in 20-year) tide event plus 250mm freeboard; OR a modelled 5% AEP (1 in 20-year flood event) plus a 0.5% AEP (1 in 200-year) tide event plus 250mm freeboard; OR 11.9m above Christchurch City Council Datum (the maximum 200-year tidal contour) plus 250mm freeboard; whichever is the greater; and ii. allowance for 1 metre of sea level rise and an increase in rainfall intensity by 16% through to 2115 as a result of climate change; and iii. a maximum buffer extension of the modelled rainfall event areas by 60 metres in a north/south and east/west direction. Provide for development of a residential unit on residentially zoned land in the High Flood Management Area where the flooding risk is predominantly influenced by sea-level risk and where mitigation can be provided to protect people's safety, well-being and property from unacceptable risk. Avoid subdivision, use or development in the High Flood Hazard Management Area where it will increase the potential risk to people's safety, well-being and property. Avoid activities locating where they could undermine the integrity of the Waimakariri River primary stopbank system, and restrict activities locating where they could undermine the integrity of the Waimakariri River secondary stopbank system. Maintain the flood storage capacity and function of natural floodplains, wetlands and ponding areas, including the Hendersons Basin, Cashmere Stream Floodplain, Hoon Hay Valley, Cashmere-Worsleys Ponding Area, Cranford Basin and Lower Styx Ponding Area[1]. Except for filling required to meet minimum floor levels, ensure that filling in urban environments at risk of flooding in a major flood event does not transfer flooding risk to other people, property, infrastructure or the natural environment.	**WAIMAKARIRI FLOOD MANAGEMENT AREA** Additions to existing buildings that do not increase the ground floor area of the building. Buildings/structures without floors Some filling and excavation. Utilities. **HIGH FLOOD HAZARD MANAGEMENT AREA** Subject to standards: The replacement or repair of buildings (provided ground floor area is not greater than existing). Utilities. Repair, rebuild and maintenance of critical infrastructure and associated ancillary structures. Accessory buildings without floors in rural zones. Farm buildings or accessory buildings with floors in rural zone (if on piles or not exceeding 200m2 GFA). Below ground swimming pools in rural zone. Above ground swimming pools in rural zones. **LIQUEFACTION MANAGEMENT AREA**					

Plan	Objectives	Policies	Permitted	Controlled	Restricted Discretionary	Discretionary	Non Complying	Prohibited
		Reduce potential flood damage by ensuring floor levels for new buildings or additions to buildings, except those unlikely to suffer material damage, are above flooding predicted to occur in a major flood event, including an allowance for appropriate freeboard. [1] This policy does not foreclose compensatory storage being provided for where filling is required. **5.2.2.3 Policy for managing risk from liquefaction** **5.2.2.3.1 Policy - Management of liquefaction risk** Map the Liquefaction Management Area based on a district-wide assessment of where damaging liquefaction is more likely to occur. Provide for rezoning, subdivision, use and development on flat land where liquefaction risk has been appropriately identified and assessed, and can be adequately remedied or mitigated. **5.2.2.4 Policies for managing risk from slope instability** **5.2.2.4.1 Policy – Slope instability** Map areas of slope instability risk at an area-wide scale using the provided fixed inputs into calculations to establish the Annual Individual Fatality Risk for a typical residential site. In slope instability hazard management areas in the Port Hills and across Banks Peninsula: i. avoid subdivision, use and development where the activity will result in an unacceptable risk to life safety (AIFR $\geq 10^{-4}$ using the GNS Science method and parameters for establishing life safety risk), taking into account all relevant site-specific information and any hazard mitigation works proposed; and ii. otherwise, manage subdivision, use and development so that risk of damage to property and infrastructure is mitigated to an acceptable extent. **Policy 5.2.2.4.2 – Site Specific Risk Assessment** (a) Provide for site-specific assessment of risk from rockfall and/or cliff collapse, in Rockfall Management Area 1, Rockfall Management Area 2, and/or Cliff Collapse Management Area 2, in accordance with the method and parameters described in Policy 5.2.2.4.1a (along with all relevant site-specific information) in order to allow for the issue of AIFR certificates.	All activities, unless specified as a Controlled or RD Activity or elsewhere in the plan.					

Plan	Objectives	Policies	Permitted	Controlled	Restricted Discretionary	Discretionary	Non Complying	Prohibited
		(b) Make information from site-specific assessments of risk from rockfall and/or cliff collapse (which have been certified by the Council) readily publicly available. (c) Regularly notify changes to the District Plan, as required to change the planning maps, in order to reflect updated information from site-specific assessments of life-safety risk from rockfall and/or cliff collapse which have been certified by the Council. **Policy 5.2.2.4.3 -Slope instability for the Port Hills and Banks Peninsula** (a) In areas not already identified in Policy 5.2.2.4.1a as being subject to cliff collapse, rockfall or mass movement, but where the land may be subject to slope instability: i. to the extent appropriate, require proposals for subdivision, use and development to be assessed by a geotechnical specialist to evaluate the presence of hazards and level of risk to people and property (including infrastructure) from slope instability hazards; and ii. only allow subdivision, use and development where risk can be reduced to an acceptable level. (b) Avoid hazard mitigation works in areas of the Port Hills and across Banks Peninsula where cliff collapse or mass movement is likely to destroy or significantly damage such works, or where construction or maintenance of hazard mitigation works creates a safety hazard, unless reasonably required to protect critical infrastructure. (c) Control hazard mitigation works and hazard removal works for slope instability across all other areas of the Port Hills and Banks Peninsula, to ensure that works: i. are effective; ii. do not worsen any existing natural hazard; and iii. do not transfer or increase the risk to other people, property, including critical infrastructure or the natural environment.						

Appendix 6 Proposed Natural Hazards Provisions

NH-O1	Risk from natural hazards
New subdivision, land use and development: 1. manages natural hazard risk, including coastal hazards, in the existing urban environment to ensure that any increased risk to people and property is low; 2. is avoided in the Ashley Fault Avoidance Overlay and high hazard areas for flooding outside of the urban environment where the risk to life and property are unacceptable; and 3. outside of the urban environment, is undertaken to ensure natural hazard risk, including coastal hazard risk, to people and property is avoided or mitigated and the ability of communities to recover from natural hazard events is not reduced.	

NH-O2	Infrastructure in natural hazards overlays
For infrastructure within natural hazard overlays: 1. existing infrastructure can be upgraded, maintained and replaced; 2. new non-critical infrastructure does not increase the risk to life or property from natural hazard, including coastal hazard, events and is designed to maintain its integrity and ongoing function during and after natural hazard events, or is easily replaced; 3. critical infrastructure is avoided in high flood hazard areas and high coastal flood hazard areas, unless there is a functional need or operational need for the location or route.	

NH-O3	Natural hazard mitigation
Adverse effects on people, property, infrastructure and the environment resulting from methods used to manage natural hazards are avoided or, where avoidance is not possible, mitigated.	

NH-O4	Natural defences
Natural defences and systems are maintained to reduce the susceptibility of people, communities and property and infrastructure from natural hazard events.	

The policies proposed to support Objective NH-O1, NH-O2, NH-O3 and NH-O4 are:

NH–P1	Identification of natural hazards and a risk-based approach
Identify natural hazards, including coastal hazards, through the use of overlays and assess the risk for the management of subdivision, use and development within the overlays based on:	

1. the sensitivity of the building occupation to loss of life, damage to property from a natural hazard and the ability for communities to recover after a natural hazard event; and
2. the level of hazard presented to people and property from a natural hazard, recognising that climate change will alter the frequency and severity of some natural hazard events.

NH–P2	Activities in high flood hazard areas within urban areas

Manage subdivision, use and development for natural hazard sensitive activities within high flood hazard and high coastal flood hazard urban environments to ensure that:

1. minimum floor levels are incorporated into the design of development to ensure the risk to life and potential for building damage from flooding is mitigated; and
2. the risk to surrounding properties is not significantly increased and the net flood storage capacity is not reduced; and
3. the conveyance of flood waters is not impeded; or
4. the nature of the activity means the risk to life and potential for building damage from flooding is low.

NH–P3	Activities in high hazard areas for flooding outside of urban areas

Avoid subdivision, use and development for natural hazard sensitive activities outside urban environments in high flood hazard and high coastal flood hazard urban environments unless:

1. the activity incorporates mitigation measures so that the risk to life, and building damage is low;
2. the risk from flooding to surrounding properties is not significantly increased;
3. the conveyance of flood waters is not impeded; and
4. the activity does not require new or upgraded community scale natural hazard mitigation works.

NH–P4	Activities outside of high hazard areas for flooding

Provide for subdivision, use and development associated with natural hazard sensitive activities outside of high flood hazard and high coastal flood hazard urban environments where it can be demonstrated that:

1. the nature of the activity means the risk to life and potential for building damage from flooding is low; or
2. minimum floor levels are incorporated into the design of development to ensure building floor levels are located above the flood level so that the risk to life and potential for building damage from flooding is avoided; and
3. the risk from flooding to surrounding properties is not significantly increased and the net flood storage capacity is not reduced; and
4. the ability for the conveyancing of flood waters is not impeded.

NH–P5	Activities within the Fault Awareness Overlay and Ashley Fault Avoidance Overlay

For activities within fault overlays:

1. only allow subdivision, use and development for natural hazard sensitive activities in the Ashley Fault Avoidance Overlay where the risk to life or property is low; and
2. manage subdivision in the Fault Awareness Overlay so that the risk to life and property is low.

NH–P6	Activities within the Liquefaction Hazard Overlay

Manage subdivision within the Liquefaction Hazard Overlay to ensure that the risk to life and property is low.

NH-P7	Additions to buildings for existing Natural Hazard Sensitive Activities

Provide for additions to buildings for existing natural hazard sensitive activities where it can be demonstrated that:

1. the additions provide for the continued use of the existing building; and
2. the change in on site risk from the building additions to life and property is low; and
3. the risk from the natural hazard to surrounding properties and people is not significantly increased.

NH–P8	Subdivision, use and development other than for any natural hazard sensitive activities

Allow for subdivision, use and development associated with activities that are not natural hazard sensitive activities within all natural hazard overlays as there is a low risk to life and property.

NH-P9	Community scale natural hazard mitigation works

Natural hazard mitigation works:

1. undertaken by the Crown, the Regional Council or the District Council are enabled where community scale natural hazard mitigation works are necessary to protect existing communities from natural hazard risk which cannot reasonably be avoided, and any adverse effects on the values of any identified ONL, ONF, SAL, scheduled natural character areas, the coastal environment, and Sites and Areas of Significance to Māori are mitigated; or
2. not undertaken by the Crown, the Regional Council or the District Council, will only be acceptable where:
    a. the natural hazard risk cannot reasonably be avoided;
    b. any adverse effects of those works on the values of any areas identified as ONL, ONF, SAL, scheduled natural character areas and the coastal environment, and on Sites and Areas of Significance to Māori are avoided, remedied or mitigated in accordance with the provisions in those chapters;
    c. the mitigation works do not transfer or create unacceptable hazard risk to other people, property, infrastructure or the natural environment; and
    d. the mitigation works do not involve the construction of private flood mitigation measures such as stopbanks, or floodwalls to protect new hazard

	sensitive activities as these works could result in significant residual risk to life or property if they fail.
NH-P10	**Maintenance and operation of existing infrastructure**
Allow for the operation, maintenance, replacement, minor upgrading, repair and removal of all existing infrastructure in identified natural hazard overlays.	
NH-P11	**New below ground infrastructure and upgrading of infrastructure outside of high hazard areas**
Provide for new and upgrading of existing below ground infrastructure outside of high flood hazard and high coastal flood hazard areas, where: 1. if located within a flood assessment or coastal flood assessment overlay, the original ground level is reinstated at completion of the works; 2. it does not increase the risk to life or property from natural hazard events; 3. it does not result in a reduction in the ability of people and communities to recover from a natural hazard event; and 4. it is designed to maintain reasonable and safe operation during and after a natural hazard event.	
NH-P12	**New below ground infrastructure and upgrading of infrastructure within high flood hazard and high coastal flood hazard areas**
Provide for the installation of new and upgrading of existing below ground infrastructure in high flood hazard or high coastal flood hazard areas where: 1. the infrastructure does not exacerbate the natural hazard risk or transfer the risk to another site; 2. the conveyance of flood waters is not impeded; 3. there is a functional need or operational need for the infrastructure to be located in a high flood hazard or high coastal flood hazard area and there are no practical alternatives; and 4. the location and design of the infrastructure address relevant natural hazard risk and appropriate measures have been incorporated into the design to provide for the continued operation.	
NH-P13	**New above ground critical infrastructure and upgrading of critical infrastructure within high flood hazard and high coastal flood hazard areas**
Only allow for the new and upgrading of existing above ground critical infrastructure in high flood hazard or high coastal flood hazard areas where: 1. there is a functional need or operational need for that location and there are no practical alternatives; 2. the location and design of the infrastructure address relevant natural hazard risk and appropriate measures have been incorporated into the design to provide for the continued operation; and 3. the infrastructure does not exacerbate the natural hazard risk or transfer the risk to another site.	
NH-P14	**New infrastructure and upgrading of infrastructure within fault overlays**
Within the fault overlays:	

1. provide for new and upgrading of existing not critical infrastructure below and above ground in the Ashley Fault Avoidance Overlay where:
    a. it does not increase the risk to life or property from a natural hazard event; and
    b. it does not result in a reduction in the ability of people and communities to recover from a natural hazard event;
2. avoid new and upgrading of existing critical infrastructure below and above ground in the Ashley Fault Avoidance Overlay unless there is no reasonable alternative, in which case the infrastructure must be designed to:
    a. maintain, as far as practicable, its integrity and ongoing operation during and after natural hazard events; or
    b. be able to be reinstated in a timely manner;
3. enable small scale critical infrastructure and other infrastructure in the Fault Awareness Overlay, while ensuring that larger critical infrastructure does not increase the risk to life or property from natural hazard events unless:
    a. there is no reasonable alternative, in which case the infrastructure must be designed to maintain, as far as practicable, its integrity and ongoing operation during and after natural hazard events; or
    b. be able to be reinstated in a timely manner.

NH-P15	Natural defences providing natural hazard resilience

Protect natural features which assist in avoiding or reducing the impacts from natural hazards, such as natural ponding areas, wetlands, water body margins and riparian vegetation, dunes, berms and beaches from inappropriate subdivision, use and development and restore, maintain or enhance the functioning of these features.

NH-P16	Redevelopment and relocation in coastal hazard and natural hazard overlays

Encourage redevelopment, or changes in land use where that would reduce the risk of adverse effects from natural hazards, including managed retreat and designing for relocation or recoverability from natural hazard events.

NH-P17	Hard engineering natural hazard mitigation within the coastal environment

Only allow hard engineering natural hazard mitigation within the coastal environment that reduces the risk of natural hazards when:

1. soft engineering measures would not provide an appropriate level of protection and it can be demonstrated that there are no other reasonable alternatives;
2. the construction of hard engineering measures will not increase the risk from coastal hazards on adjacent properties that are not protected by the hard engineering measures;
3. where managed retreat has not been adopted and there is an immediate risk to life or property from the natural hazard;
4. it avoids the modification or alteration of natural defences and systems in a way that would compromise their function as natural defences; and
5. significant adverse effects on natural defences and systems from those measures are avoided, and any other adverse effects are avoided, remedied or mitigated.

NH-P18	Wildfire and ice risks

Manage wildfire and vehicle crash risk on roads affected by ice hazard through restrictions on the planting of woodlots and shelterbelts.	
NH-P19	**Other natural hazards**
Encourage the consideration of other natural hazards such as tsunami as part of subdivision, use and development.	